

COMPUTERWORLD

Visual tool eases Java development

By Frank Hayes

Think of it as "Visual Basic for Java." Rogue Wave Software, Inc. this week will roll out JFactory, a \$495 visual development environment for Java, Sun Microsystems, Inc.'s development language for the Internet. And unlike most Java development systems, JFactory is much more than a gussied-up code editor.

"You can basically prototype your whole user interface, create your menus and hook up menus and buttons to dialogs and windows — without writing a single line of code," said beta user Mark Rhoads, vice president of software engineering at Information Presentation Technologies, Inc. in San Luis Obispo, Calif.

"We've spent the last six months building a front-office trading system, with the front end being in Java," said Steve Yalovitsky, a consultant for Chemical Banking Corp. in New York. "The poor guy who built the user interface by hand, when I showed him JFactory, was ready to drop everything and just use this

Java, page 15



Duke Power shifted to in-house development on DB2 mainframes and Windows clients after its ambitious project with Oracle failed

Utility unplugs object project

By Thomas Hoffman and Julia King

Duke Power Co. pulled the plug on a \$23 million object-based customer information system after Oracle Corp. failed to deliver it within a promised two-year window. *Computerworld* has learned.

Last week, Duke executives declined to disclose how much money the company lost through its abandoned Project Sea Green effort.

Oracle was supposed to deliver the object-based customer system in one "big bang" by the end of last year, Duke officials said. But the utility balked when Oracle asked for yet another two years to complete it.

A former Duke systems analyst said "zero percent" of the object investment is recoverable. The Charlotte, N.C.-based utility is consequently being forced to take a \$12 million charge against its fiscal 1995 revenue, said the systems analyst, who asked to remain anonymous.

Utility unplugs, page 125

Hot seat!

Support, NT server troubles plague Netscape

By Kim S. Nash

User complaints about poor technical support and unreliable World Wide Web servers have begun to ding the armor of Internet knight Netscape Communications Corp.

Several users last week cited problems with Netscape's Windows NT products and with technical support in general. But the vendor's Unix line, from which the NT servers were ported, appears to be unaffected.

Bug fix in the works

Netscape acknowledged the problems and was eager to right past wrongs.

"One of our biggest challenges has been scaling our support opera-

tions to handle a customer base that's gone from zero to 25 million in two years," said David Pann, a server product manager at Netscape in Mountain View, Calif.

Meanwhile, a bug fix for the NT version of Commerce Server, Release 1.13, is expected to be ready for downloading from Netscape's Web site (<http://www.netscape.com>) this week or next, he added.

One user who had problems was United Video Satellite Group, Inc., which saw Netscape's \$1,295 Commerce Server mysteriously crash several times during the 90 days it ran at the cable and satellite company in Tulsa, Okla.

United Video was running six do-

Netscape, page 125



Server bundle = free switch

LinkSwitch sales

3Com officials claim the company sells a LinkSwitch 1000 every 10 minutes.

By Bob Wallace and Bob Francis

The hot deal this week: Buy two servers, get an Ethernet switch — worth almost \$5,000 — free. That's a first.

And that's what Dell Computer Corp. will formally announce as part of an ongoing alliance with switch-

ing giant 3Com Corp. Dell will bundle two of its Pentium-based servers, with a 12-port 3Com Ethernet LinkSwitch 1000 thrown in for free.

Though internetworking vendors have slashed prices on their switches in the past year, no vendor has given away switches until now. 3Com, which already leads the desktop Ethernet switch market, wants to pad its lead over aggressive rivals.

Dell's so-called Bandwidth Booster Bundle eliminates bottlenecks in client/server networks by install-

Free switch, page 16

Look Out, Here Comes India

U.S. companies: Meet your new competitive weapon.
U.S. programmers: Meet your new rival.



His name is Ashok Shantha Narendra Kumar, or Naren for short. He's 23 years old, works for a leading Indian software company in Bangalore, makes the equivalent of \$4,500 a year — and might be working on a project for your company.

There are about 130,000 highly skilled programmers just like Naren in the Indian labor market, and some 20,000 new ones enter the workforce every year. Is he your company's next secret weapon or the bane of your existence?

See In Depth, page 100.

Newspaper

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News

NEWS

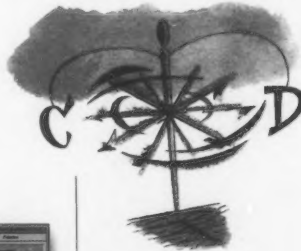
- 4 IBM notebooks**
IBM will flesh out its portable lines with a series of "value" notebooks — and is going full steam ahead with its plans for a low-cost Internet terminal.
- 6 In-security**
Users never can completely trust their encryption systems.
- 8 Microsoft reorg**
Despite his denial that he'd create an Internet division, last week Microsoft Chairman Bill Gates took it all back.
- 10 Oracle tools**
Oracle will begin shipping servers and tools that manage multiple types of data.
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Since IBM bought Lotus last June, Notes users have been relieved to see business as usual.

OPINION

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Much as he abhors censorship, Paul Gillin makes the case for some limits on the Internet.
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Michael Cohn says there are a thousand reasons not to build a data warehouse.
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Who needs to migrate? A user group likes what it sees of the Win 95 interface included in NT, Charles Babcock reports.

Choice Cuts

More than 50 vendors support a standard for adding 3-D to the Internet. See page 65, The Internet section



Change in the weather. We ask three experts if the decentralization front has blown itself out. See **Managing**, page 78

Software analyst Chuck Phillips of Morgan Stanley chronicles CA's quiet, but substantial, rise on Wall Street. See **Finance & Investing**, page 122



Technical Sections

SERVERS & PCS

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Digital linear tape is an ever-popular means to back up high-end PC servers. But another technique from Exabyte is coming along that could give it some serious challenge.
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Hewlett-Packard is offering multimedia versions of X Window System terminals for use as Internet access stations.

SOFTWARE

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Client/server applications grow up — and out.
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Group calls for users, vendors to take the hype out of "information hypeway."
- 60 NetWare tools**
NetWare management tools keep on rolling out.

THE INTERNET

- 65 Intranet wares**
These days, intranets — internal programs that run over protected parts of the public Internet — are a lot like presidential candidates: You hear a lot about them, but you're not quite sure what they can do for you. Several vendors aim to show you with new products due out soon.
- 66 Banyan's plans**
Banyan is going Internet with a new division and a bunch of E-mail products for businesses and consumers.

CORPORATE STRATEGIES

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Pier 1 Imports dodged the industrywide downturn in holiday shopping, due partly to the success of a homegrown inventory management system.
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Blue Cross/Blue Shield of Minnesota expects to save \$1.7 million in software costs by 1999, thanks to a mainframe-based audit package it's using.

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Becoming a manager inspires everything from elation to terror. Tips from some who made the transition.

BUYER'S GUIDE

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The RAID storage market is exploding, which makes options plentiful for buyers in the Unix and mainframe sectors.

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COMPUTERWORLD'S
TechnoTrivia
DO YOU KNOW

In what year did Time name the computer its "Man of the Year?"
The answer is in these pages! Now through May you can play COMPUTERWORLD's game of information retrieval — and turn trivia into treasure!
See page 28 for "everything you need to know to win!"



IS YOUR BACKUP TOUGH ENOUGH FOR THE JOB?

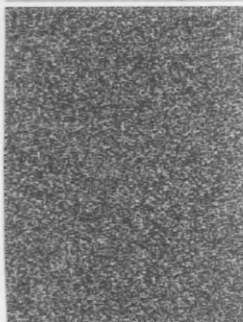
Is your critical data guarded by a puny backup solution that doesn't scale up? Backup Express™, new from Syncsort, is fast and powerful, designed specifically for today's distributed networks, where the data grows every day. Backup Express™ backs up and restores gigabytes of data fast—whether on UNIX, NetWare, or Windows NT. If you want a backup strong enough to keep your network data secure and bring it back fast, call us.

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This isn't a test pattern



No, an image won't pop out if you stare at this picture long enough. This is an "infoimage," an executable computer file that can be sent by fax. Infomaging Technologies in Palo Alto, Calif., has released 3D Fax Software, which compresses and encodes PC files into a black-and-white pattern. The image can be sent from one PC fax modem to another, or it can be printed and sent to a fax machine. The recipient can scan the image into a PC, and the software re-stores the file to its original computer format, including color pictures and multimedia clips.

Democracy tech



Political junkies who are trying to find meaning in the results of the New Hampshire primary and citizens who want to nail down the presidential candidates' positions on important issues can check the following Web sites:

- Real-time voting results, "insider" political commentary and campaign finance reports at <http://www.ElectionLine.com>
- Nonpartisan, comprehensive information geared to what voters want to know at <http://www.vote-smart.org/>
- Cyberpolitics with an attitude from the digerati at *Wired* magazine at <http://www.netizen.com/>
- For hands-on experience in making policy decisions, try Reinventing America, a political simulation game at <http://www.pathfinder.com/reinventing>

License plates make high-tech statement

Compiled by Kim S. Nash

- H8ORCL — on a black BMW driven by an Informix executive
- BSD UNIX — on a white Honda Accord, near Mountain View, Calif.
- NTWKGNL [Network General] — on a black Lexus in San Francisco
- 3AMD386 — on a Jeep Cherokee in California
- UZ A MAC — on a Volvo 740 in Burlingame, Calif.
- SQLTEXT — on a silver BMW 525i in California
- EWORLD [Apple's underwhelming on-line service] — on a car headed toward San Jose, with a license plate holder that says, "Try it. You'll like it."

Peanuts, popcorn, software?



Passengers on Midway Airlines' Boston to Raleigh flights may find a surprise shrink-wrapped with their package of peanuts: software from America Online. Can cereal boxes be far behind? — Allan E. Alter

America Online diskettes are so pervasive — it seems every PC magazine has one attached somewhere — that some Usenet wags call AOL the Free Diskette of the Month Club. They say they toss the freebies into a box and use them as "scratch" diskettes for temporary files, travel and giveaways. "I'll never have to buy disks again," one collector says. "I have noticed that, after formatting them, these are the [disks] that seem to fail the most."

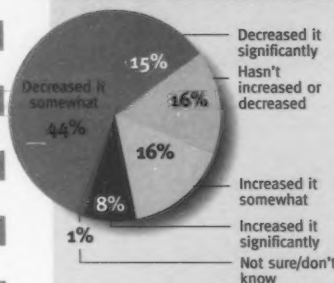
■ Send contributions of offbeat news, lists and anecdotes to mbetts@cw.com.
COMPUTERWORLD FEBRUARY 26, 1996 (<http://www.computerworld.com>)



In a rare case of computers applied to superstition, land developers in Hong Kong use a

geographic information system to avoid building in "feng shui lanes." Feng shui is the ancient Chinese practice of making sure that your building isn't located on an unlucky "dragon line" or underground river, which would knock your "celestial yin and yang" out of harmony. See the report at <http://www.geoplan.ufl.edu/~frankz/paper/fengshui.html>.

Has technology cut paperwork?



Base: 150 executives at large companies
Source: RHI Consulting, Menlo Park, Calif.

Digital Frontiers

The boisterous trading floors on Wall Street will be replaced by the kind of lightning-quick, supercomputer-driven market that operates in Switzerland, predicts John Marthinsen, economics professor at Babson College in Babson Park, Mass.

The Swiss financial markets two months ago merged into EBS (Elektronische Borse Schweiz), a computerized trading system that handles stocks, bonds, commodities and derivatives. EBS processes transactions in about seven seconds. And Swiss traders and brokers can telecommute, because they don't have to be in the same place to conduct business.

Marthinsen, author of *Switzerland: A Guide to Capital Markets*, says die-hard Wall Streeters will resist the technology. But the supercomputerized market is inevitable, he argues, and will have ripple effects. For example, trading floors won't be necessary, and firms will leave high-rent financial districts.

New ThinkPads, Internet devices on way from IBM

By Jaikumar Vijayan

IBM last week drew up a Big Blueprint for its mobile PCs, sketching in an upcoming line of midrange ThinkPads and a few details about its inexpensive InterPersonal Computer (IPC) devices.

A few customers are already testing two prototype models of the IPC, which IBM Chairman Louis V. Gerstner announced at Comdex/Fall '95.

"It is not just a \$300 to \$500 box, but a series of new technologies," said Robert Stephenson, senior vice president and group executive at IBM.

IBM by midyear will refresh its ThinkPad line with several Intel Corp. Pentium-based "value" notebooks priced between \$2,000 and \$3,000.

At least one of the ThinkPads will carry a price tag of less than \$2,000, IBM officials said last week in a briefing.

The notebooks, some of which will be announced in the next three months, will replace IBM's aging 486-based ThinkPad 365 models. Several will feature 12.1-in. screens.

Later this year, IBM will release a Pentium-based "ultraportable" model that will fall between the 300 and 700 ThinkPad lines in performance and capabilities. Those units, which will start with 100-MHz Pentium models, will weigh 4 pounds. They will be 1.25 in. thick and have 12.1-in. screens.

"All this sure sounds encouraging. IBM has always had good products in the portable space, but they have been pricey in the past," said Marshall Fernholz, network control manager at the American Medical Association in Chicago.

The moves signal IBM's rather belated attempt to enter the booming value market. Vendors such as Texas Instruments, Inc., NEC Corp. and Dell Computer Corp. have ratcheted up blistering sales in this segment, noted William Zinsmeister, an analyst at International Data Corp. in Framingham, Mass. "IBM continues to be a technology leader in portables, but at the end of the day, the volumes are shifting to the midrange and the entry level," he said. "That is where IBM is continuing to lose."

Meanwhile, several users have IPC prototypes. One is a 486-based system capable of some tasks, such as file saving, but most of the data resides on the host network. The second is a similar system based on a Pentium. The third is a handheld device.

Rather than "lobotomizing a machine" just to access the World Wide Web, IBM may extend PC architectures and package them for specific applications, said Steve Kleynhans, an analyst at Meta Group, Inc. in Yorkdale, Ontario.

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if you play the accordion,
can you also wail on the **bass**?

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OLE Automation	Yes	No	No
Visual Basic® Scripting	Yes	No	No
Native ODBC Interface	Yes	No	No
Mail-Based Queries and Alerts	Yes	No	No
Extended Stored Procedures	Yes	No	No
Rich Engine Cursors	Yes	No	No

Microsoft

WHERE DO YOU WANT TO GO TODAY?

As of January 15, 1996, SQL Server has the highest transaction throughput of any Windows NT database, as published in the ongoing industry TPC® benchmarks. Over the past three years, Microsoft SQL Server has set 13 new performance records in published TPC-C and TPC-B benchmark results. *According to market research published by International Data Corp. ©1996 Microsoft Corporation. All rights reserved. Microsoft, Visual Basic, and Windows are registered trademarks and BackOffice, the BackOffice logo, Where do you want to go today?, and Windows NT are trademarks of Microsoft Corporation. TPC-C is a registered trademark of Transaction Processing Performance Council. UNIX is a registered trademark in the United States and other countries. Licensed under the name of Microsoft Corporation.

Big iron/Web link concerns users

By Craig Stedman and
Jaikumar Vijayan

IBM last week fleshed out its mainframe Internet features. But users said IBM still has to prove that turning System/390s into World Wide Web servers won't expose sensitive corporate data to the outside world.

IBM plans to release a secure version of its Internet Connection

Server for MVS later this year, but the company didn't provide a specific shipment date. A second release of the OS/390 operating system, due in September, will also include tighter security for Web-based applications.

But several mainframe customers remain in a show-me mood. "We do not want any outside exposure to our customer data at all period," said Michael Pully, manager of resource management at Barnett Banks, Inc. in Jacksonville, Fla. "I don't think we're going to be on the leading edge of this."

Western Surety Co. also isn't sold on the idea of a mainframe-based Web server. "We want someday to take our business on to the Web, but we have to work out the security features," said Patrick Curren, a senior systems programmer at the Sioux Falls, S.D., company. The firm provides bonding indemnification services for businesses, contract workers and self-employed individuals.

Western Surety is looking at creating a corporate intranet, and its mainframe may have a role to play there as a database server, Curren said. But external Web server activities are more likely to

be handled by a smaller system that could fetch data as needed from the System/390, he added.

IBM is trying to make it easier to link big iron to the Web. The

first release of OS/390, which is scheduled to ship in late March, will include an Internet BonusPak that can be installed in a partition on an existing mainframe. This

can be done without upgrading the whole machine to the new operating system, IBM officials said.

Several other mainframe-to-Internet links were promised for shipment this year (see box).

Network-centric computing is IBM's new mantra, and the computer giant is trying to cloak its products in Internet trappings.

System/390s have to be part of that effort, said Ira Machefsky, an analyst at Giga Information Group in Santa Clara, Calif. "But typically, you want to protect your mainframe behind a firewall," he added.

Last week's announcement also included IBM's three other hardware units. From an Internet perspective, the PC server group is most prominent. Its NetFinity systems management software, which is being renamed PC SystemView 4.0, lets network administrators use an Internet connection and a Web browser to manage LAN-connected PCs.

IBM also is bundling its OS/2 Warp Server-based Internet connection software with its PC Server 320 systems. That emulates similar moves made recently by Compaq Computer Corp. and Hewlett-Packard Co.

Unix server makers promise to ratchet up performance. See page 41.

Web of iron

IBM will equip System/390s with the following Internet-related technologies:

- ▶ Support for security protocols such as Secure Hypertext and Secure Sockets
- ▶ Integrated World Wide Web gateways to CICS and IMS transaction monitors
- ▶ Direct Web browser interface to CICS
- ▶ Ability for Web browsers to access mainframe data via MQSeries middleware
- ▶ System/390 support for Web gateway to DB2 database

Notes eyes port to mainframe

Notes may have some big iron in its future.

IBM's mainframe division is embarking on a test port of Notes 4.0 to its OS/390 operating system. If enough performance can be wrung out of the code, a System/390 version of the groupware product should become available in 1997.

Demand for Notes on the mainframe is likely to be limited compared with the Unix or Windows NT versions, said David Marshak, an analyst at Patricia Seybold Group in Boston. But System/390 support could provide tight integration of Notes desktops with mainframe-based transaction data, he said.

Concerns that the mainframe plans could work against IBM's vow of platform neutrality for Notes "could be valid if we were creating something unique for the System/390. But that's not what we're doing," said Charles Lickel, vice president of System/390 business plans and systems architecture. Instead, the mainframe unit uses the standard Notes code base and ports it to the Unix-compliant OpenEdition MVS portion of OS/390, he said.

IBM said it also expects to put Notes on the AS/400 next year, but first it will support the software on a 486-based co-processor due out in June.

—Craig Stedman

Kerberos code crack raises broader issues

By Gary H. Anthes

The cracking of Kerberos underscores the fact that no security product is 100% effective.

Kerberos is a system that uses encryption to protect users at financial institutions, universities and government agencies around the country. Two students at Purdue University recently found a

way to break the encryption that is employed in a widely used version of the software.

"These things come up constantly," said John S. Swanteck, vice president of desktop administration at First Union Corp. in Charlotte, N.C. He said the bank isn't at risk because it uses a version of Kerberos from Transarc, Inc. that doesn't have the defect.

Nevertheless, Swanteck said fears about security mechanisms that don't work as intended have led First Union to drastically limit its connectivity to the Internet. "I get very nervous about it," he said.

"All security systems, crypto or otherwise, will likely have bugs or weaknesses," said Jeffrey Schiller, a developer of Kerberos and network manager at MIT. "The complexity of modern programming systems combined with human frailty more or less guarantees that."

The flaw in Kerberos results from the failure of the software to

generate random numbers of sufficient length, which allows them to be easily guessed and then used to decipher users' secret "session keys." That would enable an intruder to gain access to a system without knowing a password.

"Fixing Version 4 should be a top priority for users," said Eugene Spafford, an associate professor of computer science and director at the Purdue laboratory where the defect was discovered. "Someone writing a very simple program in a matter of seconds can gain complete authority in a Kerberos Version 4 installation."

Glitches galore

The Kerberos defect is the latest in a series of glitches recently found — many by amateurs — in the systems users count on to ensure privacy and data integrity (see chart).

Schiller acknowledged that the security flaw in Kerberos Version 4 was known at MIT as early as 1989. "Frankly, we didn't plan on V4 being around as long as it has," he said. "Also, in 1989 we knew that the random number generator in V4 was bad; we just didn't appreciate how bad it was."

Experts agreed that the flaw is serious, but they cautioned users of cryptography against panic.

"We have to put security in a broader context," said Stephen T. Kent, chief scientist for security technology at BBN Corp. in Cambridge, Mass. "The way most break-ins occur in the Internet today is through flaws in operating systems. The use of cryptography isn't going to fix most of those flaws."

Corrections

Due to a reporting error, "See me, feel me, touch me, heal me" [CW, Feb. 5] contained an incorrect price for Kurzweil Applied Intelligence, Inc.'s voice-recognition systems. Prices are \$995 to \$8,000.

Due to an editing error, a chart on page 43 in the February issue of *Computerworld Client/Server Journal* should have stated that Cisco Systems, Inc.'s fiscal first-quarter revenue was \$710.2 million. That figure was incorrectly cited as first-half revenue.

Weak links

The glitch found in the Kerberos system joins a growing list of shortcomings found recently in widely used encryption methods

AUGUST 1995

A French student cracked Netscape's 40-bit key used to encode a message.

DECEMBER 1995

A cryptography expert devised a "timing attack," which allowed him to derive secret keys by analyzing the time it takes a computer to perform various cryptographic operations.

SEPTEMBER 1995

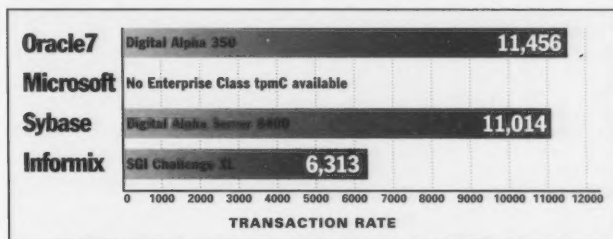
Two students at the University of California found a flaw in Netscape's random number generator, which allowed them to decode encrypted messages.

FEBRUARY 1996

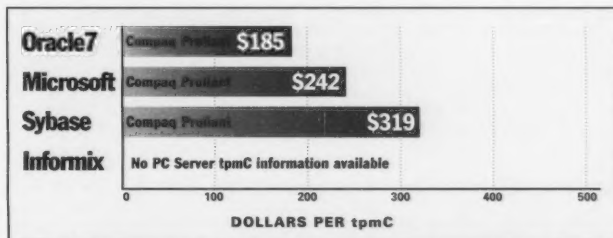
A panel of cryptographers published a paper that said the widely used Data Encryption Standard algorithm is at risk.

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Microsoft shuffles; Internet ends up at top of the deck

By Stuart J. Johnston

Sometimes, even Bill Gates has to eat his own words.

Microsoft Corp.'s reorganization last week, which affected mainly product groups, included the creation of a separate division to focus on the Internet and related technologies (see chart).

Less than three months ago, company chairman Gates had disavowed any intent to create such a division.

At the time, he said the Internet would be integral to everything the company does in the future so having a division dedicated to it would be "like having an electric-ity division."

New line

The official company line is quite different now. "There are certain core technologies that we need to focus on that need to be released more quickly than traditional systems," said Paul Maritz, vice president of the Platforms Group at Microsoft.

For example, the company in-

tends to ship multiple versions of its Explorer browser during the next year, he said. That's a far different pace from the one Microsoft usually takes when it enhances its operating systems.

Some observers expressed concern about the fate of Microsoft products. "I'm a little worried that in the quest to become leaders in the Internet, they'll lose leadership somewhere else, like BackOffice," said Bill Cornfield, president of the Windows Support Group, a New York consultancy.

But Cornfield said he thinks the move makes sense overall. Other industry watchers agreed.

"It makes me feel more comfortable about the Internet and about what Microsoft is doing," said Kelly Dwyer, director of global information technology at Braxton Associates in Boston, the strategy consulting unit of Deloitte & Touche.

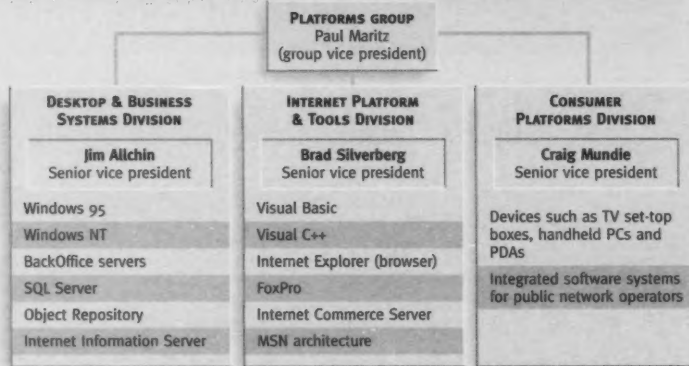
"Forming an Internet group can only mean they'll be even more focused on getting good products out" for internal and ex-

ternal Web applications, said Charles Williford, an information systems specialist at Owens-Corning Fiberglass Corp. in Toledo, Ohio.

Among the changes that users and analysts found most promising was the consolidation of Windows 95 and Windows NT under the Desktop and Business Systems Division, which is headed by Senior Vice President Jim Allchin. This group also will handle BackOffice servers.

Some customers have complained that each product group at Microsoft pushed only the operating system for which it was responsible — Windows 95 or NT.

Microsoft adds an Internet division



At the same time, the company's overall message was that customers should deploy Windows 95 on machines with less memory and NT for higher-end applications.

"Given the mixed messages they've sent in the past, putting [Windows 95 and NT] under one umbrella is a good idea," said Dwight Davis, editor of "Windows Watcher," an industry newsletter in Redmond, Wash.

The responsibility for marketing and designing core functionality for Windows 95 will reside with Allchin's group, but the evolution of Windows 95's user interface belongs to the Internet division.

Officials said Windows interface design is there because of Microsoft's intent to incorporate Internet browser capabilities, including support for Java and Visual Basic Script, directly in to the user interface in the next release.

Senior Vice President Brad Silverberg, who previously led the Personal Systems Division where Windows 95 was developed, will head the Internet Platform and Tools Division.

Senior editor Kim S. Nash contributed to this report.

Banyan is also reorganizing because of the Internet. See page 66.

News Shorts

Notebook kingpins slip

Three of the top four notebook vendors lost market share in the U.S. last year, according to **International Data Corp.** in Framingham, Mass. The research firm late last week released figures that showed that **IBM PC Co.**, **Compaq Computer Corp.**, and **Apple Computer, Inc.** all lost market share last year, and **Toshiba America Information Systems, Inc.** consolidated its hold on the No. 1 spot with 20% of the market. IBM's share slipped from 12.6% to 11.5%, although unit growth rose a modest 2%. Compaq went from 12.3% to 10.8%, and Apple dropped from 10.2% to 8.4%. Overall, the U.S. market grew 12%, from 3.2 million units to 3.6 million.

On-line on the block

Owners of two of the three biggest on-line services said they will sell their businesses. **H & R Block, Inc.** in Kansas City plans to spin off its **CompuServe, Inc.** subsidiary beginning in April and ending by February 1997. And **Sears, Roebuck and Co.** ended months of speculation by announcing it will unload its share of **Prodigy Services Co.**, which the Chicago retailer jointly owns with IBM. H & R Block and Sears said they will drop their on-line interests to focus on their core businesses.

DCE moves forward

Computer Associates International, Inc. and **IBM's Transarc Corp.** subsidiary this week will announce that they will enable CA-Unicenter to manage networks that are based on the Open Software Foundation's Distributed Computing Environment (DCE) technology.

Architecture chief joins Kmart
Federated Department Stores, Inc.'s chief systems architect David Guzman will leave the company next month to join **Kmart Corp.** Kmart, which has delayed many information systems projects in recent months because of the company's financial hard times [CW, Feb. 5], has been without an architecture chief since Paul Gaffney left the company last fall.

Remote access options

Cascade Communications Corp. last week announced **HyperPath**, a package that will let telephone companies that use its wide-area network switches give users the option to outsource their remote access operations. The package will let users ditch remote access servers with Integrated Services Digital Network (ISDN) support, but analysts say it lacks support for analog dial-up links. **HyperPath** is available now, and **Cascade** said it is being evaluated by eight U.S. carriers.

ISSC does Denny's

Flagstar Companies, Inc. in Spartanburg, S.C., a restaurateur that owns **Denny's**, **El Pollo Loco** and other restaurants, outsourced its information systems operations to **Integrated Systems Solutions Corp. (ISSC)**, a subsidiary of IBM. Flagstar officials said they expect net savings of more than \$150 million under the 10-year, \$323 million agreement.

Middleware melee

Rivals Candle Corp. and **Boole & Babbage, Inc.** are targeting systems management products at IBM's MQSeries

middleware, which lets distributed systems communicate. **Candle**, in Santa Monica, Calif., is shipping a mainframe-based version of its **Candle Command Center** that can monitor MQSeries on multiple platforms. **B&B**, in San Jose, Calif., will announce this week that an MQSeries version of its **MainView** software will be ready in the fourth quarter.

IBM buys Smalltalk vendor

IBM agreed to acquire **Object Technology International, Inc. (OTI)**, which produces the **Envoy/Developer Smalltalk** development environment. OTI, which already licenses its technology for IBM's **VisualAge Smalltalk** system, will continue to operate as an independent subsidiary in Ottawa. Financial terms of the deal weren't disclosed.

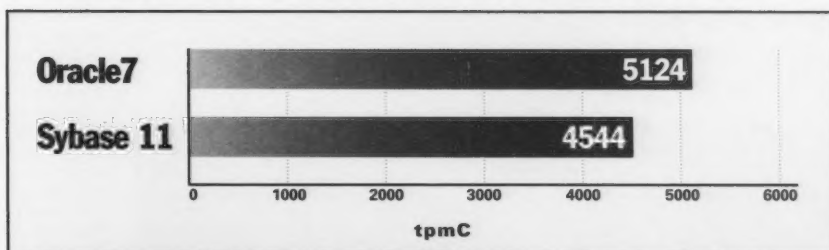
ISDN for NetWare

Novell, Inc. users soon will be able to dial in and out of **NetWare LANs** via ISDN lines because of a new hardware/software package developed by **Novell** and **Eicon Technology, Inc.** The offering is in beta testing and lets **NetWare** users dial in to **Novell's NetWare Connect 2.0**.

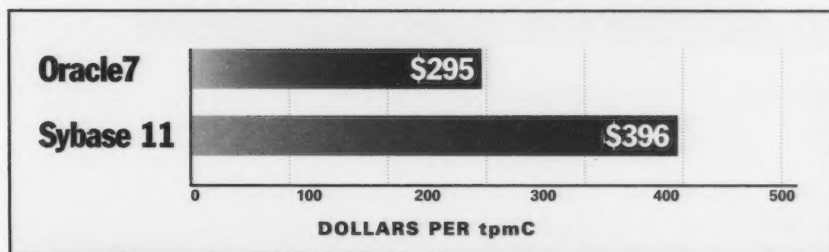
Oracle7 Outshines Sybase on Sun

The TPC-C benchmark is the industry standard test for measuring database On-Line Transaction Processing (OLTP) performance.

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When Oracle and Sybase were tested on a 16-cpu Sun Solaris system, Oracle clearly out-performed Sybase System 11 on price and performance. (It's almost not worth mentioning, but we also creamed Informix.) Just one more proof point that Oracle7 is faster, cheaper and better. Think about it. Then call Oracle, 1-800-633-1071, ext 8118.

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Oracle begins Universal Server rollout

Family of servers, tools will manage multiple data types from single app

By Dan Richman

Oracle Corp. today will begin shipping most pieces of its Oracle Universal Server, its framework for the next several years.

Universal Server is a family of servers and tools that will manage multiple data types beyond character and numeric data. Among these are video, images, spatial information and text. It does this from within

a single development and administrative environment and also from within a single application.

Universal Server reflects a trend within the database industry to expand the capa-

bilities of relational database management systems. All of Oracle's rivals have announced similar plans.

Oracle users said Universal Server should help their businesses.

"We believe it means we won't have to write as many [application programming interfaces] to make different Oracle servers work together," said Henry Kucera, head of data administration at the British Columbia Ministry of Environment, Lands and Parks. "It will also simplify licensing and ensure that all the pieces are available on all the platforms we want to run on."

Another user, Matt Sherek, database administrator at catalog retailer Fingerhut Cos. in Minnetonka, Minn., said Universal Server "might make it possible for customers to use the Internet to call in, see videos of products in use, then place orders — all on the same hardware and software."

The Redwood Shores, Calif., company will modify Universal Server to accommodate the long-promised Oracle8, an object/relational database scheduled to ship by mid-1997.

Universal Server includes either the workgroup or the enterprise edition of Version 7.3 of

the Oracle7 RDBMS, plus any or all of five additional servers: the Con-Text text-search server, a video server, a spatial-data server, an on-line analytical processing server and a messaging server. It also includes Oracle's Advanced Network Option security software and the Enterprise Manager management and monitoring software.

Release of the components will be staggered over the next four months.

Free upgrades

Current licensees of Oracle7 will be upgraded automatically, at no charge, to Version 7.3. Included free with 7.3 will be Web-Server 1.0, which allows Oracle data to run on the Internet.

The components within Universal Server will sell for 15% to 30% of the cost of Oracle7 Version 7.3, but that product's pricing is unclear.

One spokesman said the Oracle7 workgroup edition starts at \$1,500 and the enterprise edition starts at \$16,000 in the U.S. But other spokesmen gave a more complex pricing scheme. They said new buyers who can count their users will pay \$295 per concurrent user for the workgroup server and \$1,995 for the enterprise server. Sites that can't count users, such as those that open their databases to Internet visitors, will pay \$5,900 per processor for the workgroup server and \$63,840 per processor for the enterprise server.

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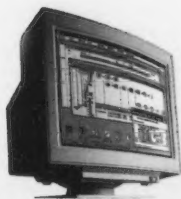
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HP finds high security 'net niche

Virtual Vault a secure but pricey firewall

By Craig Stedman

Hewlett-Packard Co. has acquired technology that will let customers build military-class security in to their World Wide Web servers.

This latest effort takes HP beyond the me-too category and into a high-end security realm that rival vendors haven't staked out, analysts said.

The software was developed by SecureWare, Inc. in Atlanta.

It is supposed to prevent unauthorized users from breaking in to customer accounts and other data stored on Web servers that process transactions via the Internet.

Locked away

HP's Virtual Vault puts a secure Web gateway on top of a trusted operating system that doesn't give root users any control over the server. The technology blocks a common method that is used to take over systems.

The increased protection

makes it feasible to install a Web server outside of a corporate firewall so that external users can easily access business services, according to Virtual Vault's first user.

"It restricts people to only communicating with our servers in the ways that we dictate they can," said Michael Karlin, president of Security First Network Bank, an on-line bank in Pineville, Ky.

Customer data is protected in an internal partition that can't be penetrated by outside users or the bank's own employees, Karlin said.

Audit logs have captured some suspicious activity, but there have been no security problems since the bank began operating in October, he said. "People have come knocking, but they haven't gotten in."

For now, Virtual Vault is complex and requires deep pockets. HP officials said the software needs custom engineering and

Secure in their ways

Three approaches to Internet security

Virtual Vault

The Web server is secured by an operating system with B1-class security and a Web gateway that separates users from corporate databases. Root users have no power of control, and system administrators are prevented from gaining access to data.

Firewalls

A common first line of defense that functions as a filter, similar to a security guard in the lobby of a building.

Data encryption

Data traveling across the Internet can be encrypted to prevent hackers from deciphering the contents.

Source: Illuminata, Inc., Nashua, N.H.

consulting services that can push the tab to more than \$100,000;

that compares with a cost of about \$20,000 for a high-end firewall. HP said it hopes to bring the price down into the firewall range within the next year by creating a more packaged version.

Despite the high cost, analysts said the acquisition sets HP apart from its competitors, something that the introduction of its Web server in late January failed to do [CW, Jan. 29].

Spicing it up

"HP was late to the Internet game and had a very vanilla story before, and it wasn't even a particularly flavorful vanilla," said Jim Greene, an analyst at Summit Strategies, Inc. in Boston. "This gives them something to stand on that's more credible."

The software runs only on HP's hardware for now, but it will be ported to other Unix platforms and Windows NT this year, said Jan Silverman, director of Internet solutions at HP.

Virtual Vault also will be integrated with smart-card user authorization technology and HP's OpenView and OpenMail products, Silverman said.

Microsoft backs up BackOffice

By Frank Hayes

Can BackOffice make it as a full-fledged enterprise system? Hoping to give users the tools they will need to make it so, Microsoft Corp. next week will announce that it has signed Synon, Inc. to provide an application generator for its BackOffice suite.

Synon already has ported its AS/400-based Obsidian development system to Windows NT to several versions of Unix. But under the deal, a new version of Obsidian will generate server applications that tightly integrate with BackOffice's security, management and networking systems.

That release, which will be tested at sites in early May, will make Windows NT much more credible as a replacement for traditional midrange systems, users said.

Just the ticket

"We're totally an AS/400 house, and we want to extend the life of our legacy systems while at the same time [move] into the Windows environment and a client/server architecture," said Wynne Powell, senior vice president and chief operating officer at London Drugs Ltd. in Richmond, B.C. "This gives us a real infrastructure to work in."

Microsoft still will provide NT's C++ development tools, officials at both firms said. But Synon's Obsidian will offer users a system in which developers can define business objects and application designs and generate the application code automatically.

The system will cost \$8,750. It will have a set of more than 300 prebuilt business objects, a team repository, graphical modeler and user-interface designer.

Until recently, many users have viewed NT as a network or file server, not a replacement for the minicomputer.

But BackOffice gives NT users a collection of services that are common in mainframes and proprietary minicomputers, said David Guzman, director of information technology architecture at Federated Department Stores, Inc. in Cincinnati. He cited elements such as a standard database, networking and utilities that have been left out of client/server operating systems such as Unix.

Big system backup moves to PC servers. See page 41.

Netscape gives nod to VMS users

Web software, suite slated to hit the streets in June

By Michael Goldberg

The World Wide Web is about to open wider for OpenVMS users.

Netscape Communications Corp. said it will port its server software to OpenVMS, Digital Equipment Corp.'s proprietary operating system for VAX and Alpha servers, by midyear.

Users at the December meeting of the Digital Equipment Computer Users Society (DECUS) and on the Internet's OpenVMS user

group have been clamoring for what they consider to be first-tier Internet software products.

Those users contacted by *Computerworld* last week hailed the pending arrival of Netscape Web server packages.

Anticipation

"VMS users are very much sitting on the edge of their seats for this" in the belief that Netscape is a de facto industry standard for Web servers, said Kenneth Fairfield, a systems programmer at the Stanford Linear Accelerator Center in Stanford, Calif.

Netscape expects OpenVMS versions of its software for Web applications to be available by the

end of June. Digital plans to make an OpenVMS Internet product suite available in June or July. The suite would include Netscape's Communications and Commerce Server and other software (see chart).

Susan Denham, OpenVMS Internet product manager at Digital, said the suite would cost between \$50 and \$100, plus licensing fees from software vendors. The Internet suite will require that computers run Version 6.1 or higher of OpenVMS.

"It's a network-centric world right now, and... we need to have these types of tools," said Margaret H. Knox, associate director at the Computation Center at the University of Texas at Austin.

Terry Shannon, an industry analyst and editor of the "Shannon Knows DEC" newsletter in Ashland, Mass., said porting Netscape server software to OpenVMS is another example of Digital's work "to extend the life" of the operating system.

Digital last year introduced a program to give OpenVMS users

Support and NT server troubles plague Netscape. See page 1.

Underground access

Digital plans to offer a new version of its OpenVMS Internet Product Suite every few months.

The second version, due in early 1997, will include Digital's tunneling technology, which allows remote users to gain access through a corporate firewall.

Unix and NT

Netscape makes its server software available on Unix systems by Sun Microsystems, Digital, Hewlett-Packard, IBM and Silicon Graphics and on servers that run Windows NT.

access to applications that run on Windows NT.

"We've been waiting for [Netscape on OpenVMS]. We have it running on Sun and HP and [Macintoshes] and PCs now," said Ed James, manager of computer and communications services at Lockheed Martin Corp.'s Laboratories in Baltimore.

James said the laboratory is a heavy user of internal Web pages and would like to outfit its OpenVMS servers with Netscape software.

Digital's OpenVMS Internet Product Suite on CD-ROM will come bundled with the following software products:

- Netscape Navigator and Spyglass Enhanced Mosaic client software
- Netscape Communications Server, Netscape Commerce Server and Purveyor Server
- Digital Firewall for OpenVMS
- Tools for creating World Wide Web pages with graphics, checking HTML syntax and converting text to HTML

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Graceful scaling across databases. The beauty of Borland's client/server tools is that they allow you to build applications that meet changing business requirements. With the

built-in SQL Links capabilities in Delphi, users can readily access all of the most popular SQL databases, including Oracle, Sybase, Informix, Microsoft SQL Server, and InterBase.* FNB built their applications on the InterBase database and found it to be the easiest SQL server to install, use, and maintain.

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provides all the tools for professional client/server development including a Data Dictionary, Object Repository, SQL Monitor, Visual Form Inheritance, integrated Version Control, and more. You don't have to choose between productivity and performance, or power and flexibility anymore.

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Switch vendors add 'net wares

By Bob Wallace

Forget the Nestea Plunge. Dive into the Internet instead.

That's what Bay Networks, UB Networks and TGV Software did last week with products that let users maximize use of the Internet.

The moves are further evidence of an emerging trend whereby traditional internetworking vendors are looking to new profit horizons by diversifying their longtime product mix of switches, hubs and routers [CW, Feb. 19].

Bay Networks, Inc. last week moved to acquire Internet access server vendor Performance Technology, Inc. for \$13 million in cash. UB Networks, Inc. announced plans to embed Java capabilities in its EMPower Management subsystem, which can be used to manage UB switches

and hubs (see chart).

And TGV Software, Inc. detailed sorely needed Internet server software.

Bay's acquisition of Performance Technology will give it the Instant Internet package, which lets medium-size and small sites link LANs to the Internet without requiring each Novell, Inc. IPX client to run an IP stack.

The Instant Internet server connects users of Novell's NetWare and Microsoft Corp.'s Windows 95 and Windows NT to the Internet without requiring changes to LAN clients or servers.

One longtime Bay user was pleased to see the vendor getting into the Internet products market. Bernie McGrory, a network analyst at the Lahey Clinic/Dartmouth Hitchcock Medical Center in Burlington, Mass., said Bay's move "could mean that we'll be able to buy less expensive devices

Taking the Internet plunge			
Vendor	Product	Price	Availability
TGV Software	Cheetah Web Server	Starts at \$295	Q1 1996
	MultiNet Information Server	Starts at \$945	Q2 1996
	MultiNet Enterprise Server	Not released	Q2 1996
UB Networks	EMPower application with Internet access	Not released	This summer
	EMPower code with embedded Java support/embedded applets	Not released	Second half 1996
	Third-party Java-based EMPower applications	Not released	1997

for our Internet connections."

For its part, TGV announced new software packages that enable users to build flexible and scalable intranets, or internal company internets. The software runs on Digital Equipment Corp.'s OpenVMS, Sun Microsystems, Inc.'s Solaris and the Windows 95 and NT platforms.

The new MultiNet Information Server comprises two components: Cheetah Web Server and WebClusters. Cheetah Web Server provides a means to centrally and remotely manage a series of

information services using a graphical user interface.

The dearth of versatile commercial World Wide Web servers had forced one user to take a long look at public domain offerings. Then TGV came along with Cheetah Web Server.

"I feel much more comfortable with a vendor-backed server rather than going the other way and being unsure of service and support," said Mike White, a senior systems programmer at Ball State University in Muncie, Ind., a Cheetah Web Server beta site.

"The TGV system is also much easier to install and configure, which are big pluses."

The WebClusters component performs load balancing and replication of content among multiple Web servers. Replication of content decreases the time involved in managing and uploading content across multiple Web servers.

TGV's second new software package is called MultiNet Enterprise Server. It provides network services needed to build and maintain TCP/IP networks across multiple platforms.

IP routers debut at half the going rate

By Stewart Deck

Sourcecom Corp. has dropped the price bar in the Internet access router limbo contest. The Santa Clarita, Calif., company has come out with InRoute, a line of Ethernet IP routers that offer high-speed Internet access and support Novell, Inc.'s IPX protocol at about half the going price.

Analysts said they expect competitors such as Cisco Systems, Inc. to bring down the price of their lowest-end routers, but matching Sourcecom's \$500 street price will be difficult.

"Sourcecom has carved out a niche for themselves and has taken a big lead in the inexpensive router market," said Frank Dzuback, an analyst at Communications Network Architects, Inc. in Washington.

The downside is that the Sourcecom routers don't offer some of the features of more expensive routers. The stripped-down routers lack data compression and Integrated Services Digital Network (ISDN) support.

Stripped-down works for some users. InRoute "was just what we were looking for," said Tanver Anas, president of Security Sys-



Sourcecom's InRoute is a stripped-down router

tems Integration and Consulting, Inc. in Glendale, Calif. "These are flexible and full-functioning routers with bridging that supports high speeds. That, combined with the price, was very attractive to us." Security Systems provides real-time stock market data to brokerages. The firm lets brokers dial in to its network for market information and needed a backbone router to handle the job.

By Patrick Dryden

Hewlett-Packard Co. this week will offer network management software designed to ease the monitoring, troubleshooting and upgrading of its internetworking gear.

The Interconnect Manager automatically discovers HP's hubs, switches, bridges and probes and displays them graphically. Administrators can pick devices from the map for remote ex-

Cheyenne, PSI combine utilities for NetWare

By Laura DiDio

In a move that could save time and energy for network administrators, Cheyenne Software, Inc. and Preferred Systems, Inc. (PSI) are combining their respective migration and management utilities into a single software package for Novell, Inc.'s NetWare.

Cheyenne in Roslyn, N.Y., makes the ARCserve network backup software package. PSI in West Haven, Conn., markets DS Standard, a directory services management and configuration utility. DS Standard lets adminis-

trators create Novell's NetWare Directory Services (NDS) trees off-line and speeds migration from NetWare 3.x to 4.1.

The companies said they will deliver ARCserve 6 for NetWare with DS Standard NDS Manager Version 2.0 later this year in a two-phase rollout.

In the first stage, which starts immediately, a 45-day promotional copy of DS Standard NDS Manager will be included on the ARCserve 6 for NetWare CD-ROM. The 45-day trial can be extended

by calling PSI directly, said Jack Serfass, the company's president. The second phase — delivery of the two utilities on the same CD-ROM software package — will begin in the fourth quarter.

Users and systems integrators said having ARCserve and DS Standard in the same software package would save time, conserve human resources and ensure that network administrators wouldn't duplicate efforts.

Kevin Puent, a senior network analyst at Nortel Communications Systems in San Ramon, Calif., said a combined software package would have immediate benefits in his environment. It would allow Puent to view and build NetWare 3.x bindery databases, migrate them directly into the NetWare 4.1 NDS tree and back up all the information simultaneously.

"This is an incredibly big time-saver — up to two weeks' worth of work in new network installations or migrations to NetWare 4.1," Puent said. "I could view all my bindery data and migrate it directly into the NDS tree without having to rebuild the tree from scratch."

Pricing for ARCserve 6 for NetWare and DS Standard NDS Manager Version 2.0 hasn't been set.



The CW Guide to RAID storage. See page 89.

HP boosts internetworking tool kit

amination and configuration.

Supported devices include HP's hubs for 100M bit/sec. connections via the 100VG-AnyLAN topology. That's a relief to team leader Bryan Reese, who plans high-speed workgroups at 10 field offices of the U.S. Department of the Treasury's Office of the Inspector General.

"We were concerned about finding tools to monitor the VG LANs at those sites," Reese said. "We must manage them all from

Washington to save time and money."

Two other features help administrators prepare for upgrades such as switch placement.

A traffic monitor displays simple gauges for a quick check of key network performance statistics. And by tracking the busiest pairs of nodes, administrators learn where to add switched connections to optimize overall performance.

The product costs \$499.

Visual tool eases Java development

CONTINUED FROM PAGE 1

thing."

Java lets programmers create Internet applications that will run unchanged on Windows, Unix and other platforms. Developers can build small applets that can be downloaded and run as part of a World Wide Web page or as larger stand-alone applications.

But until now, developers have had to write virtually every line of Java code them-

selves. JFactory, which runs on Microsoft Corp.'s Windows 95, Windows NT and Sun's Solaris, lets developers use a mouse to drag and drop windows, menus, button and other user interface elements. Common features of Java Web page applets, such as animations, also can be created without writing code.

The development system, with a single mouse click, generates a working Java application.

Who runs Java?

Web browsers that can run Java applets support these platforms today . . .

- Windows 95
- Windows NT
- Solaris

. . . and are in beta testing for:

- Mac OS
- HP-UX

But until now, developers have had to write virtually every line of Java code themselves. JFactory, which runs on Microsoft Corp.'s Windows 95, Windows NT and Sun's Solaris, lets developers use a mouse to drag and drop windows, menus, button and other user interface elements. Common features of Java Web page applets, such as animations, also can be created without writing code.

The development system, with a single mouse click, generates a working Java application.

"The Java code JFactory produces is immediately usable on all the other released Java platforms. It just works without modification on a SPARC, for example," Rhoads said.

Some application logic requires programmers to write some Java code — for error handling and reading data from files, for example. JFactory preserves the added code even if the application's user interface is changed and the application is re-generated.

More in May

JFactory comes with about a dozen Java user interface elements, but developers can build and save their own graphical elements. Ordinary libraries of Java code also can be used with the system. Rogue Wave, which is based in Corvallis, Ore., has promised to release more Java offerings by early May.

JFactory is based on Rogue Wave's Zapp Factory C++ development system, which

Latte to go

Borland International, Inc. is working on a Java visual development environment, too. The Scotts Valley, Calif.-based company plans to roll out its Latte development system in the second quarter.

a little short of the features of popular visual development systems such as Microsoft's Visual Basic.

"You can't customize the layout manager or specify look-preference policies," Yalovitsky said. "But this is the first tool that will elevate a Java coder from being a hacker to being an interface designer."

Still, JFactory's rapid development approach is no cure-all, especially for larger Java projects. "It certainly sounds valuable,

but it won't replace careful object-oriented design, which is the most critical part of a Java project," said John Gawkowski, a Java application architect at R. R. Donnelley & Sons Co. in Chicago.

"It's absolutely not a panacea, but it's going to make a lot of people able to program with the language that they may not be able to [use] today," said Rick Brennan, manager of Web services at National Semiconductor Corp. in Santa Clara, Calif.



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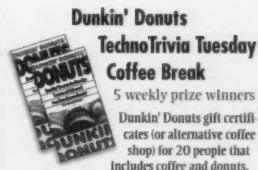
HERE ARE A FEW OF OUR WEEKLY WINNERS TO DATE:

G. Turner/DP Manager
Phoenix Metals, Inc.

B. Wright/Assistant Professor
Columbus College

K. DeMarco/Systems Manager
Stonebridge Financial

B. Wood/Systems Manager
Nucor Bearing Products



Dunkin' Donuts

**TechnoTrivia Tuesday
Coffee Break**

5 weekly prize winners
Dunkin' Donuts gift certificates (or alternative coffee shop) for 20 people that includes coffee and donuts.

R. Lute/MIS Supervisor
KMS Research, Inc.

B. Cohen/Director of Technology Svs.
Tower School

J. Brier/Director of Information Svs.
Goodwill Industries of Pittsburgh

**Sony Magic Link™ Personal
Communicator**
1 weekly prize winner



S. Gallup/Systems Developer
Kmart Corporation

R. Higgins/Sr. Technical Fellow
Federal Express Co.

J. Dissly/Development Support Mgr.
Trane Co.

For details on how to play Computerworld's
TechnoTrivia, go to page **28** in this issue.



DG keeps afloat in troubled waters

Posts two profitable quarters, unveils Intel-based servers

By Neal Weinberg

The good ship Data General Corp., which has been all but dead in the water for the better part of a decade, is starting to make headway.

In the past several months, the Westboro, Mass.-based company quelled a user uprising by introducing a line of Intel Corp.-based servers. The company also racked up two straight profitable quarters and saw its stock nearly triple in value.

By midyear, DG plans to ship servers sporting four-processor, Pentium Pro motherboards from Intel. And it will use a technique called nonuniform memory access architecture to link multiple motherboards in a symmetrical multiprocessing server that will ship by year's end.

"I think they've weathered the storm — a long, frightening storm," said Tim Boyer, data processing manager at Denmon Tire Corp. in Cleveland.

In fact, Boyer just ordered an Intel-based Avion server to re-

place his Eclipse MV. A DG customer since 1979, Boyer said he almost defected to a new vendor because he wanted to be on a Pentium-based system. "The introduction of the Intel machines has made a tremendous difference," Boyer said.

DG has done a good job managing the transition from servers running the Motorola, Inc. 88000 series chip, which the company will continue to sell, to the new Intel models, said Bob Sakakeeny,

an analyst at Aberdeen Group, Inc. in Boston.

In the latest quarter, Avion sales grew 8%, and the Intel-based Avions won 15% of total server sales. The other growth area for DG is its Clarion line of RAID storage systems. Through OEM channels, DG has boosted Clarion sales in the past four quarters from \$33 million to \$99 million.

Steven Milunovich, an analyst at Morgan Stanley & Co. in New York, predicts DG will show a 25%

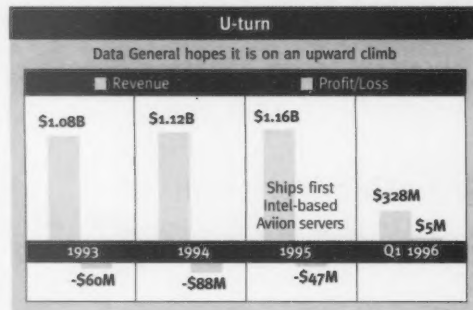
increase in revenue this fiscal year, driven by a 37% surge in Clarion sales. Milunovich estimates earnings per share of 85 cents.

That's a dramatic turnaround for a company that has lost money in nine of the past 10 years and has less revenue today than it had in 1985.

Change of heart

Users have been "really upbeat" of late, said Steve Pounds, controller at Security Forces, Inc. in Charlotte, N.C., and president of the DG user group. Last spring, users were upset about being stranded on the Motorola chip, which wasn't attracting new applications from independent software vendors.

But DG announced plans to move to Intel in June and introduced the new servers in October. The company's game plan going into next year is to sell standards-based servers — bundled with software and service — and to sell chips, boards and servers to other computer vendors, which is a new growth area, said Stephen K. Smith, an analyst at PaineWebber, Inc. in New York.



Free switch

CONTINUED FROM PAGE 1

ing a fast switch between large groups of users and centrally located Dell servers.

Ethernet switches are selling like hotcakes because they provide dedicated bandwidth per user, whereas existing Ethernets require numerous users to share 10M bit/sec. of capacity.

The Dell/3Com deal is the latest evidence of ties between server and major internetworking companies. Compaq Computer Corp. started the ball rolling when it teamed with Cisco Systems, Inc. for routing software and bought internetworking vendors Networth, Inc. in November and Thomas-Conrad Corp. in October.

High praise

"This is more than just Dell trying to sell more servers," said Daniel Briere, president of TeleChoice, Inc., a Verona, N.J., consultancy. "It's providing low-cost one-stop shopping for users who don't know much about switching. I'd expect to see other server vendors do similar deals."

One user found the package attractive.

"I'd take a good look at it if we had an application that required us to buy new servers," said 3Com user Michael Green, director of technology at Williams-Sonoma, a San Francisco-based national specialty retailer.

Green said he would like to see other vendors come up with similar programs.

"It'd be great if IBM would come up with a program like this, since we use IBM servers widely," Green said. "Users are increasingly looking for attractive bundles to make life easier."

IBM makes Ethernet switches in addition to PC servers.

Pieces of package

As part of the bundle, Dell server users get 3Com's LinkSwitch 1000 with 12 switched Ethernet ports — which support 10M bit/sec. dedicated pipes to users — and one 100M bit/sec. fat pipe to each server. The two fat pipes use existing twisted-pair wiring.

Server-wise, Dell users get two Poweredge SP 5133-2 servers, which have 133-MHz Pentium processors and the vendor's Safe-site Server Management Software. They have 32M bytes of parity RAM. The servers come with 3Com 10/100 Ethernet adapters.

"IS managers should scour the market for deals like this before they make buying decisions," Briere said.

Oil group hopes ATM yields rich strike

By Neal Weinberg

A petroleum consortium today will use the high bandwidth of Asynchronous Transfer Mode (ATM) to launch a faster way of getting crucial oil exploration data back to the people who need it most.

The ATM Research and Industrial Enterprise Study (ARIES)

project is trying a new method of transmitting seismic data gathered from ships at sea. In a demonstration, ARIES will transmit data from a ship in the Gulf of Mexico to a satellite and then onto a land-based ATM network.

"This is the big one," said Ray Cline, director of information systems at the American Petroleum Institute in Washington. There

have been other demonstrations using this technology but never with live data [CW, Oct. 23, 1995].

Seeking time savings

Cline said the ARIES project is moving toward creating a permanent ATM network that will significantly slash the time it takes to pick spots for oil drilling activities.

Under the current system, an industry subcontractor, such as Schlumberger/Geco-Prakla, gathers 60G bytes of seismic data daily from one ship roaming the ocean on a six-month voyage.

When the ship returns to shore, as many as 100 magnetic tapes are hand-delivered to scientists who analyze the data. If more readings are needed, the ship has already moved on, and it could take several more months for a ship to be rented and sent to the same spot, said Rick Morneau, staff geophysicist at Chevron Petroleum Technologies Co. in Houston.

By using ATM to send data directly to onshore scientists, decisions on where to redirect the ship can be made that same day, Morneau said. This will shave several months off the process.

In addition, the land-based portion of the ATM network will allow scientists from the various oil companies to gain access to the central repository at Schlumberger/Geco-Prakla's headquarters in Houston.

"The way to do that now is to fly people there and sit them down," Morneau said. "ATM switching allows them to tap in to companies all over the place."

Facts about ARIES

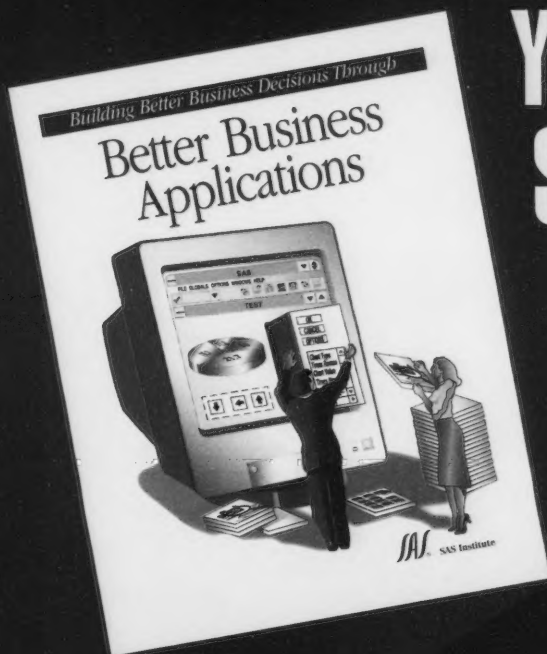


Points on the network:

- Geco Diamond ship in the Gulf of Mexico (pictured)
- Minnesota Supercomputer Center, Minneapolis
- Jet Propulsion Laboratory, Pasadena, Calif.
- Amgen, Shill, both in Houston
- Sandia National Laboratories, Livermore, Calif.
- Chevron, San Ramon, Calif.
- National Press Club, Washington

ATM speed: 45M bit/sec.

Cost: \$1 billion worth of equipment has been donated to the demonstration.



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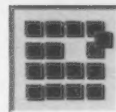
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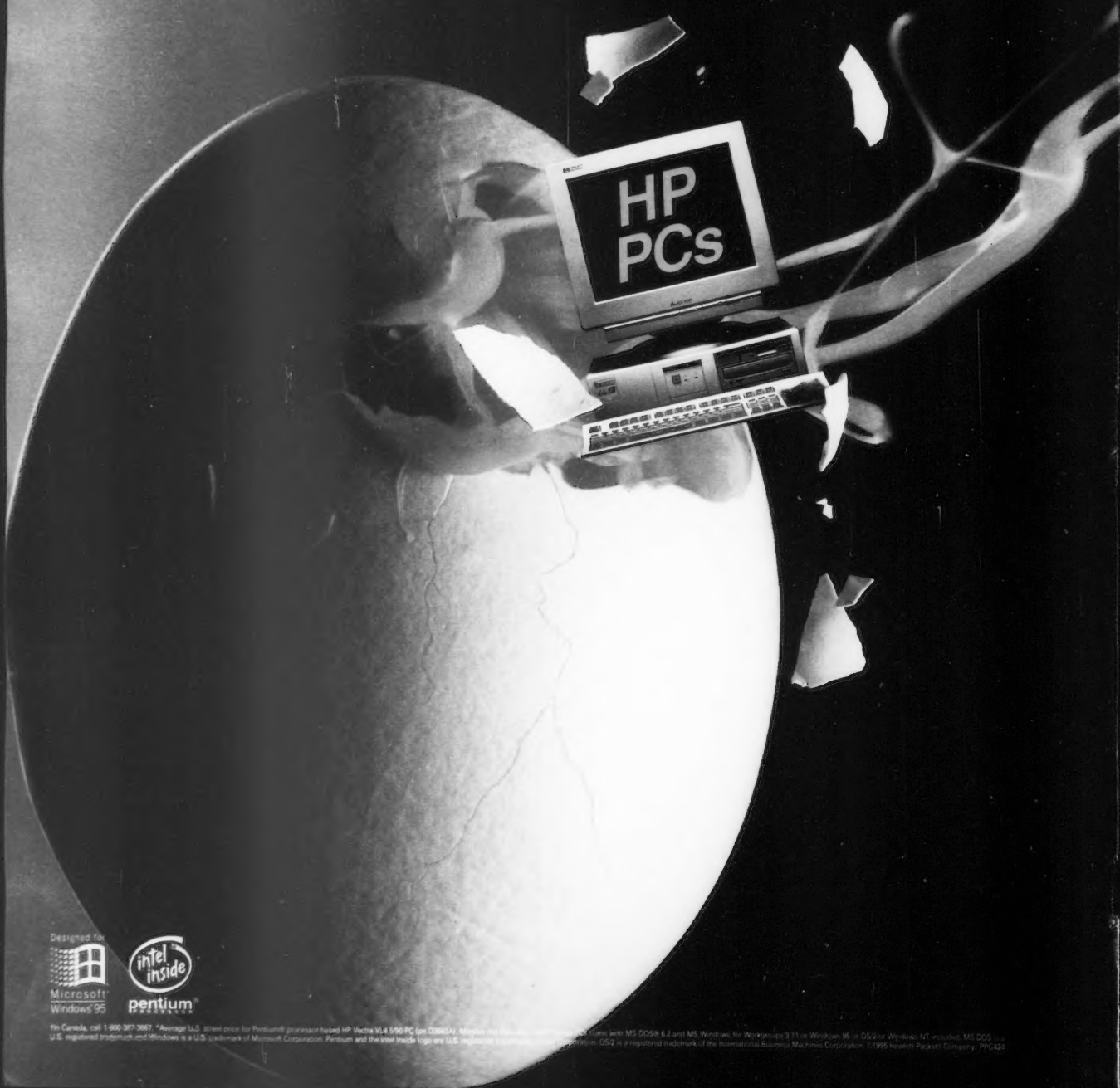
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Essbase upgrade offers greater efficiency

New versions of multidimensional DBMS shifts work to server, cuts time

By Dan Richman

Greater efficiency in slicing and dicing data is the goal behind improvements made to the latest version of Arbor Software, Inc.'s

popular Essbase multidimensional database management system.

Businesses use multidimensional database systems to perform on-line analytical processing (OLAP). OLAP is the process of

"frequently analyzing large sets of data to figure out what the hell happened, what to do about it and how well what you decided to do about it is working," said Kirk Cruikshank, vice president of marketing at

Arbor in Sunnyvale, Calif.

Essbase 4.0 will be announced next week and will ship by June 1. The product cuts the time necessary to cycle through those steps in several ways, Cruikshank said.

For example, the ranking, filtering and sorting of data is performed on the server, not on the client, before query results are returned to the user. This shift to the server reduces the time required for those tasks and the amount of data that moves across a network.

User-selected portions of the multidimensional database can be recalculated when values change or new data is loaded. Earlier versions required recalculation of the entire DBMS.

"This partial-recalc feature will save us a ton of time," said beta user Jack Wilson. He is director of corporate accounting at Equity Residential Properties, a real estate holding company in Chicago. "Right now, I constantly have users sticking their heads in my door asking, 'Is the recalc done?'"

Redesigned algorithms in the new version further cut the time necessary to aggregate days into weeks, weeks into months and months into years. The new algorithms also speed other compute-intensive but revealing views of data.

"Calculation time is a very big part of being efficient, and ours has been cut in half," said beta user Brian Post, a senior accountant at TMP Worldwide, Inc. in New York. The Yellow Pages advertising agency uses Essbase to analyze income and expenses.

The Essbase 4.0 server, which will list for \$37,500 for five concurrent users, will run on Windows NT, OS/2, Hewlett-Packard Co.'s HP-UX, IBM's AIX and Sun Microsystems, Inc.'s Solaris operating systems. The first two platforms will ship by March 15, and the others are promised by the end of May.

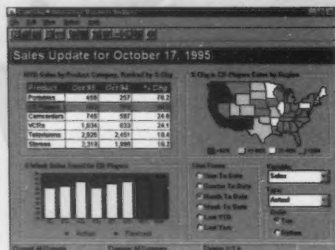
With the purchase of a server, Arbor will provide an unlimited number of client Dynamic Link Libraries, Application Manager management and monitoring packages, and application development tools.

Within the next three months, Arbor will announce products to make Essbase data accessible from World Wide Web browsers, Cruikshank said.

Simple
Question.

Simple
Answer.

Brian
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grow by more than 10% over
last year and where?
Janice
PS I know you're busy
but I need these fast!



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Leading the way

Arbor Software's Essbase multidimensional DBMS leads the market for such products, according to Meta Group, Inc. in Stamford, Conn. Strong competitors include Express from Oracle Corp. in Redwood Shores, Calif., and Lightship from Pilot Software, Inc. in Cambridge, Mass.

Chances are you're altogether too familiar with "simple questions" like these. Invariably, they come at the worst possible times. Usually, they require immediate attention. And, more often than not, there's hardly anything simple about answering them. Unless, of course, your organization is one of the thousands that have come to rely upon LightShip[®], from Pilot Software, for the power of answers on demand.

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 The lighter side of data warehousing.
See page 37.



Tom Brigham



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IBM middleware to ease wireless access

By Mindy Blodgett

IBM beat the wireless drum last week with its announcement of Artour, a client/server middleware package aimed at providing hassle-free access to the enterprise network.

IBM's entrance into the wireless arena [CW, Feb. 19] is bound to add heft to a struggling industry in need of a boost, industry observers and users said.

"Other middleware has provided similar features, but they weren't IBM," said Virginia Brooks, an analyst at Aberdeen

Group, Inc. in Boston. "The IBM name will carry a lot of weight with users who have been resisting wireless."

Lance Crawford, product manager at Sabre Computer Service in Fort Worth, Texas, said, "Anything that makes wireless easier is sorely needed."

Artour won't require modifications to back-end applications. It will support connections across incompatible wireless networks, including the ARDIS Co., RAM Mobile Data and cellular digital packet data.

Artour has two basic components, which are priced at approximately \$345 per user for a 100-user site or \$175 per user for a 1,000-user site. The components include the following:

- **Artour Mobile**, which is client software installed on an OS/2 or Windows-based notebook, is equipped with an integrated wireless modem or wireless PC card. The software will let users communicate through a wireless network based on the TCP/IP standard.

- **Artour Gateway**, which operates on an IBM RISC System/6000, is connected to both the enterprise network and the wireless service provider.

Users also have the option of wireless 3270 terminal emulation support through the following applications:

- **Artour Emulator Express Client**, which acts as an AS/400 or Systems/390 terminal, moves only new or updated information over the wireless network.

- **Artour Emulator Express Server**, which provides access to corporate networks using SNA.

Artour Emulator Express will cost \$645 per user for 100 users and \$445 per user for 1,000 users.

In addition, ARDIS last week announced a trial service of Artour Emulator Express on the ARDIS wireless network at the Network World Unplugged show in San Jose, Calif. For a period of 90 days, beginning March 15, ARDIS will provide unlimited air time, wireless modems, a host connection, user training, software installation and support for up to 25 users. The service will start at about \$20,000.

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ARDIS deal

The ARDIS Co., a wireless radio network provider, last week announced it will resell IBM's wireless modem for ARDIS in a package that will include hardware, software, service and support. Pricing will start at \$400.





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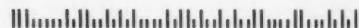
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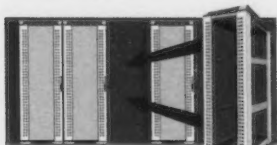
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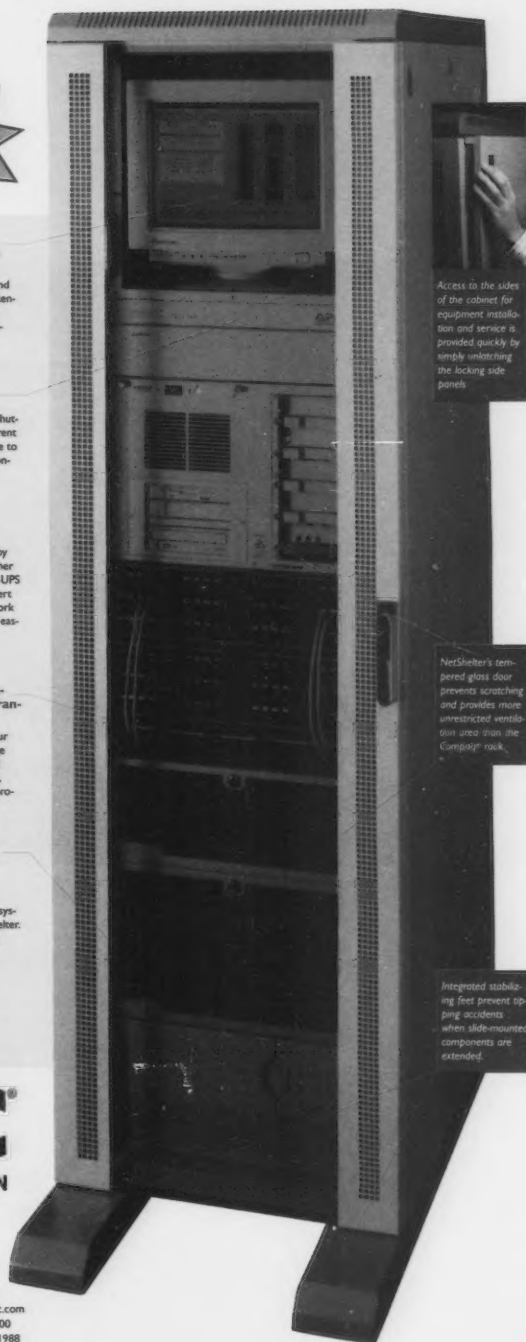
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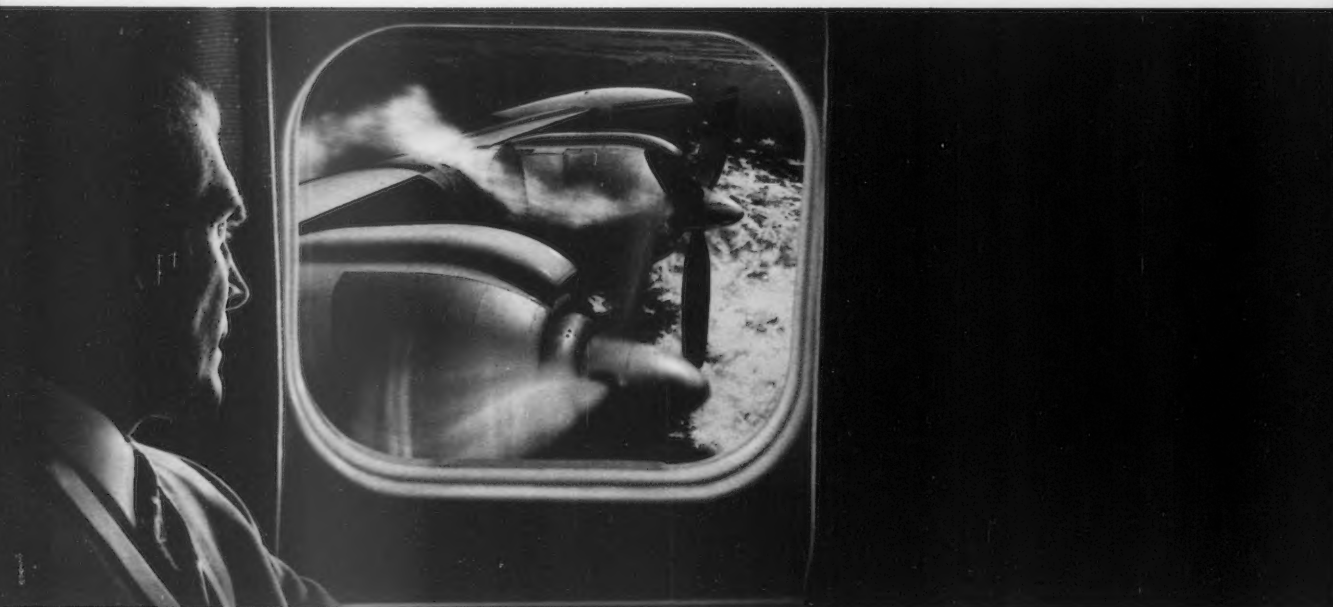
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WEEK 6 OF 19

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TechnoTrivia

THIS WEEK'S QUESTIONS:

1. In what *Walt Disney* movie do the main characters live in a computer?
2. Who is generally credited with having invented "morphing?"
3. Nomad, M-5, Noram and Landru were all computers that appeared in what TV series?
4. Who invented the mouse and how many buttons did it have?
5. In what year did *Time* Magazine name the computer its "Man of the Year?"

Trivia questions and answers provided and/or verified by Christopher Morgan and The Computer Museum.

FAX ENTRY FORM FOR WEEK 6

Question #	Correct Answer on Page #
1.	
2.	
3.	
4.	
5.	

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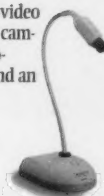


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 21. Dir./Mgr. MIS Services, Information Center
 22. Dir./Mgr. Network Sys., Data/Tele. Comm., LAN Mgr./PC Mgr., Tech. Planning, Administrative Services
 23. Dir./Mgr. Sys. Development, Systems Architecture
 31. Programming Management, Software Developers
 41. Engineering, Scientific, R&D, Tech. Management
 60. Sys. Integrators/VARs/Consulting Mgt.
CORPORATE MANAGEMENT
 11. President, Owner/Partner/General Mgr.
- DEPARTMENTAL MANAGEMENT**
 51. Sales & Mktg. Management
 70. Medical, Legal, Accounting Mgt.
 80. Information Centers/Libraries, Educators, Journalists, Students
 90. Other Titled Personnel
 3. Do you use, evaluate, specify, recommend, purchase: (Circle all that apply)
 Operating Systems
 (a) Solaris (e) Mac OS
 (b) Netware (f) Windows NT
 (c) OS/2 (g) Windows
 (d) Unix (h) NextStep
 App. Development Products ☐ Yes ☐ No
 Networking Products ☐ Yes ☐ No
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B. 10,000 - 19,999	<input type="checkbox"/>	<input type="checkbox"/>
C. 5,000 - 9,999	<input type="checkbox"/>	<input type="checkbox"/>
D. 1,000 - 4,999	<input type="checkbox"/>	<input type="checkbox"/>
E. 500 - 999	<input type="checkbox"/>	<input type="checkbox"/>
F. 100 - 499	<input type="checkbox"/>	<input type="checkbox"/>
G. 50 - 99	<input type="checkbox"/>	<input type="checkbox"/>
H. 20 - 49	<input type="checkbox"/>	<input type="checkbox"/>
J. 10 - 19	<input type="checkbox"/>	<input type="checkbox"/>
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 90. Other Titled Personnel
 3. Do you use, evaluate, specify, recommend, purchase: (Circle all that apply)
 Operating Systems
 (a) Solaris (e) Mac OS
 (b) Netware (f) Windows NT
 (c) OS/2 (g) Windows
 (d) Unix (h) NextStep
 App. Development Products ☐ Yes ☐ No
 Networking Products ☐ Yes ☐ No
- How many people are employed at this location and in your entire organization, including all of its branches, divisions and subsidiaries? (Select only one per column.)

	1. At this location	2. Entire Organization
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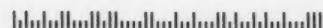
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Business as usual for Notes

By Tim Ouellette

Same story, different channel.

Since IBM bought Lotus Development Corp. last June, Notes users have been relieved to see business as usual. That is, except for the financial boost provided by IBM to cut Notes prices, the drive to get the Notes 4.0 upgrade out the door and the higher-octane marketing push in the face of competition from World Wide Web technology.

IBM is striving to increase the number of Notes users, which already has doubled since the merger (see chart). But its plans are wildly ambitious, calling for the number of Notes users to double every year through the end of the decade.

"I am very pleased about the merger and the direction they are taking," said Dennis Murray, information officer for drug registration for regulatory affairs at Sandoz Pharmaceutical Corp. in East Hanover, N.J. He echoed the reaction of several other users interviewed recently.

"I think IBM clearly understands how to manage enterprise data, and Notes is the best option to manage discussions and business processes," Murray added.

Because Sandoz Pharmaceutical uses both Notes and IBM's DB2, Murray is waiting for products to link the two systems. Today, he has to cope with two separate islands of information — one with Notes in workgroups and the other with the mainframe database software in the enterprise.

One hopeful sign is the MQSeries Connector for Notes, which

IBM, Lotus in sync on plans for groupware



"I believe in eating your own cooking. So we are going to put an internal Notes network throughout the company."

— Louis V. Gerstner, IBM chairman

is due later this year. It will use IBM's MQSeries middleware to let Notes applications exchange data with legacy systems.

IBM views Notes as a major piece of middleware, along with MQSeries and CICS. The computer giant intends to use Notes to give users a standard interface above the operating system to connect the desktop and enterprise environments, according to a report by D. H. Andrews Group, Inc. in Cheshire, Conn.

But how long the IBM/Lotus honeymoon will last is a matter for debate.

IBM needs to get a return on its \$3.5 billion investment in Lotus, and the perceived threat to Notes from similar technology available on the Web looms ever larger, analysts and users said.

"The good news is IBM doesn't seem to be interfering with Lotus," said John Hodge, chief information officer of NAC Reinsurance in Greenwich, Conn. "But the bad news is [IBM] believes that Notes is such a key product that there is a lot of integration work that can take away from the Lotus products themselves."

Competing products from traditional software giants and emerging Internet vendors such as Netscape Communications Corp. are on the way this year (see related story below).

Microsoft Corp.'s Exchange is expected to hit the streets this quarter. The company already ships the free client software with Windows 95. Yet another threat comes from Novell, Inc.'s Groupwise XTD software, due out by midyear, which will provide strong integration with popular Novell

NetWare LANs.

The Notes price cuts announced in December helped pre-empt some of this competition and win over many users, however.

The cuts "helped alleviate the one concern we had to this point, which was price," said Tim M. Crawford, information access manager for Notes at National Semiconductor Corp. in Santa Clara, Calif. He said the previous attempt at a low-cost version of Notes — Notes Express — wasn't cheap, and it didn't offer the Notes 4.0 features to make its use worthwhile.

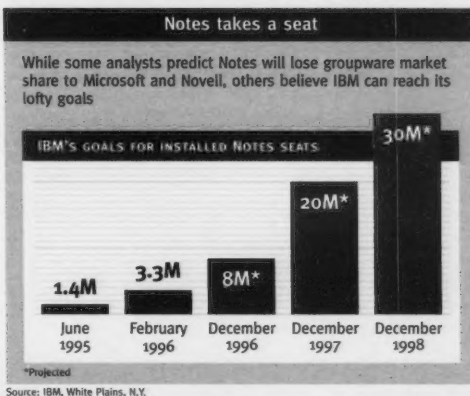
Notes customers also may be heartened to know that IBM is rolling out Notes in its own massive operation. The goal is to install up to 100,000 seats by the end of the year at the 225,000-employee computer giant, according to IBM Chairman Louis V. Gerstner.

Low profile

IBM has given Lotus free reign to get Notes 4.0 and 4.x upgrades out the door. And at the annual Lotusphere conference held recently, IBM had a very low profile. Yet while Lotus retains its name and identity, the company has had a hard time retaining high-level executives.

Since the \$3.5 billion buyout, at least 11 high-level Lotus executives have quit. That includes the recent departure of Jeffrey Beir, senior vice president of Lotus' applications business, who left last week. But Notes creator Ray Ozzie has vowed to stay put at least through the next major upgrade of Notes.

As executives have trickled out the Lotus doors, users have consistently maintained they aren't worried — as long as the Notes product team remains intact and focused.



Notes vs. the Web: What's up with that?

Will the rise of the Web ultimately mean the fall of Notes?

To some industry observers and potential groupware users, the improvement in low-cost Web technology signals the arrival of a serious and threatening alternative to Notes.

Still others see Notes 4.0's Web integration features, strong business applications and expanding developer channel as vital to IBM's success in the Internet market. In fact, the push by Lotus to have Notes work in conjunction with Web technology is vital

to Notes' survival, said Peter Raulerson, president of ParaTechnology, Inc. in Bellevue, Wash.

Notes users are increasingly voicing their interest in combining Web-enabled Notes business applications with a mix of Notes clients and cheap Web browsers for casual groupware users.

"A lot of people see the Internet as the way to create business applications that hook companies with suppliers and customers at first blush," said Scott McCready, an analyst at International Data Corp. in Framingham,

Mass. "But the Web doesn't have tools to allow them to do that."

But observers admit that Web technology and emerging standards — such as Netscape's Navigator browser combined with electronic mail and Web servers — are slowly improving. With better security and management features, many users think they can achieve Notes-like capabilities with more open and cheaper Web products, Raulerson said.

For now, though, IBM sees Notes 4.0 as a way to enhance its own Inter-

net business while connecting IBM enterprise systems with the Web. The new version of Notes can publish documents to a Web server and support Internet protocols. It also comes with a Web browser.

Notes "is absolutely core to where IBM wants to be in the next decade," said Matt Cain, an analyst at Meta Group, Inc. in Stamford, Conn.

IBM's plans to become a primary player in the network-centric computing environment by integrating large enterprise systems with desktop-oriented applications. "Notes is going to be the vehicle to make all that legacy data relevant to users," Cain said.

— Tim Ouellette

*A few thoughts about motivation and UNIFACE
application-building strongware from Jim Rutherford,
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WHAT THE BIG GUYS USE

Computer Industry

Licensing deal to broaden Mac appeal

By Lisa Picarille

Apple Computer, Inc.'s decision to license its Mac OS to Motorola Computer Group won't immediately impact Macintosh loyalists. But the attempt to more broadly deploy the operating system could help Apple attract new users.

Motorola joins a slowly expanding list of Mac OS licensees. They include Umax Computer Corp., which recently joined forces with Radius, Inc.; DayStar Digital, Inc.; Power Computing Corp.; Pioneer Electronics Corp.; and Ing. C. Olivetti & Co. Apple's decision to grant Motorola the ability to sublicense the Mac OS to additional vendors may result in further proliferation of the Mac OS. That could help boost Apple's market share.

The clone agreements also will offer Macintosh users a wider variety of systems to choose from

other than just Apple machines.

The more Apple can get its operating system software out there, "the better it is for them and for us," said Mark Munro, corporate Macintosh network manager at Jack Morton Productions, Inc. in New York. The company specializes in creating corporate training materials.

Apple/Motorola

Motorola already is shipping desktop, entry-level servers and two-way multi-processor servers that are based on the PowerPC chip. The bulk of the PowerPC systems sold by Motorola run IBM's AIX, said Joe Guglielmi, general manager at Motorola Computer Group.

But he said he expects Microsoft Corp.'s midyear delivery of Windows NT 4.0 to increase Motorola's sales of PowerPCs that run NT.

Motorola, like Apple and IBM's server division, is changing its product lines to meet the specifications of the Common Hardware

Here's the deal

Major reasons the Mac OS will run on a variety of systems from different vendors:

- Motorola is the key supplier of PowerPC chips, and the company makes PowerPC systems
- Motorola's systems run AIX or Windows NT
- The licensing deal with Apple lets Motorola run the Mac OS on its systems
- Motorola can sublicense the Mac OS to other vendors

Reference Platform (CHRP). CHRP-compliant systems will run a variety of operating systems, including Sun Microsystems, Inc.'s Solaris, Windows NT, AIX, the Mac OS and Novell, Inc.'s NetWare.

Motorola officials said the company's CHRP systems will be available in the second half of the year.

Motorola may manufacture Macintosh clones if there is de-

mand. But that isn't the thrust of this agreement because System 7.5.x, the current version of the Mac OS, is still closely tied to the hardware.

Copland, Apple's next generation of the Mac OS, will be separated from the hardware. This will make it easier for licensees to create CHRP-compliant systems that will run the Copland operating system.

Motorola's licensing of the Mac

OS is "a public relations move to show support for Apple," said Joe Ferlazzo, an analyst at Technology Business Research, a market research firm in Hampton, N.H. "Apple is the one [PowerPC] volume player, and Motorola has to do all it can at this juncture to show strong support for Apple."

Apple may get more support via a sublicensing deal between Motorola and Panda Electronics Group in China, whereby Panda will distribute Mac OS-compatible systems.

The agreement also opens the door for Motorola to license the Mac OS on its boards to other systems makers, such as Gateway 2000, Inc. and Packard Bell Electronics, Inc.

"Seems like Motorola wants to steal the Intel model of building motherboards for the entire industry. PowerPCs would say, 'Motorola inside,'" said Pieter Hartsook, editor of "The Hartsook Letter," an industry newsletter in Alameda, Calif.

IBM cans OS/2 on PowerPC; platform seen as threatened

By Lisa Picarille
and Jaikumar Vijayan

IBM's recent decision not to produce a commercial version of OS/2 for desktop PowerPC systems has left Apple Computer, Inc.'s Mac OS virtually alone for now to carry the PowerPC flag on the desktop.

But now that Apple has licensed its Mac OS to Motorola, Inc., which is already a partner in the PowerPC initiative, the Mac OS will have other vendors' support besides just Apple's (see story above).

Microsoft Corp.'s Windows NT, which also runs on the PowerPC, is expected to dent the market sometime this year.

Nevertheless, IBM's decision is seen as a loss for the PowerPC.

IBM officials maintained that the company remains committed to the PowerPC in its RS/6000 and AS/400 product lines, but

some observers questioned whether the overall PowerPC initiative can gain momentum as a mass-market alternative to the Intel Corp. juggernaut.

This also has raised fears that potential systems makers and independent software vendors might be scared away from the platform.

Initiative can't run

John Dunkle, president of Workgroup Strategic Services, Inc., a market research firm in Portsmouth, N.H., said the PowerPC initiative has become a "two-legged dog" because of the other problems the PowerPC partners face. These problems include the following:

- Motorola has been criticized for delays in bringing out new PowerPC chips and an inability to leapfrog the capabilities of forthcoming Intel Pentium processors.

• Apple, which has so far sold more than 4 million Power Macintosh systems and accounts for more than 90% of the demand for the PowerPC chips, faces its own well-publicized financial and management problems.

• Macintosh clone makers and other PowerPC vendors haven't been able to generate significant sales volume so far.

"The PowerPC is doomed to failure if Apple is selling 95% of the systems," predicted Kimball Brown, an analyst at Dataquest, Inc., a market research firm in San Jose, Calif.

But PowerPC proponents said

that as Motorola starts to sublicense the Mac OS, it is only a matter of time before these other vendors begin to deliver systems based on the Common Hardware Reference Platform. That platform supports multiple operating systems, including Sun Microsystems, Inc.'s Solaris, Novell, Inc.'s NetWare, IBM's AIX and Windows NT.

An open window

An even bigger boost for the PowerPC platform may come from NT, users and analysts said.

"NT is a very viable possibility for the PowerPC," said Pieter

Hartsook, editor of "The Hartsook Letter," an industry newsletter in Alameda, Calif.

"If a core of vendors — [such as] Compaq, Gateway and HP — put muscle behind it, that could be very significant," Hartsook said.

Users agreed.

"Personally, I don't see Apple being able to increase [its] market share from now on. But they are not the only player in town," said Jamie Carr, president of In-sync Corp. in Bethesda, Md., a software developer that uses a Windows NT-based PowerPC 604 system.

Stacking up

A look at the offerings from major chip vendors

Vendor	Chip	Operating systems supported	Customers
Intel	x86, Pentium Pro	DOS, Windows, Windows NT	Compaq, IBM, Dell and hundreds of others
Digital	Alpha	Digital Unix OpenVMS	Digital, Cray
Sun Microsystems	SPARC	Solaris Unix	Sun, ICL Fujitsu
Hewlett-Packard	PA-RISC	HP-UX Unix	HP, Convex
IBM, Motorola, Apple	PowerPC	Windows NT, Mac OS, AIX	IBM, Apple, Motorola
Silicon Graphics, MIPS Technologies, NEC	R series	Windows NT	SGI, Tandem, Siemens-Nixdorf, NEC

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AGENDA

MORNING SESSIONS - 9:00-12:15

- **Hype, Health, and Heartache in IT and Communications Markets**
Vicki J. Brown, Senior Vice President
- **The Era of the Wired Consumer: Discontinuity, Opportunity, Success, and Failure**
Frank Gens, Senior Vice President, Worldwide Research
- **The Internet's Impact on Corporate Computing**
David Vellante, Senior Vice President, Systems, Software, & Storage
- **Technologies for the Wired Market**
John Gantz, Senior Vice President, Personal Systems and Collaborative Computing

Session A 9:00 - 1:00	Session B 9:00 - 1:00	Session C 9:00 - 1:00
TRACK 1	TRACK 1	TRACK 1
Planet PC: The Global Market Perspective <i>Bruce Stephens</i>	How Competing Selling and Creating Demand <i>Richard Detschenebaum</i>	Mobile Computing and Communications in the Connected Age <i>Randy Gupta • Michael French • John Gillet</i>
TRACK 2	TRACK 2	TRACK 2
Cybercash: Mass Market Retailing <i>Gigi Wang</i>	Application Hosting in the Cyber Millennium <i>Mark Winters • Michael Sullivan-Trester</i>	CyberAge LANs <i>Lee Doyle</i>
TRACK 3	TRACK 3	TRACK 3
Systems & Server Market Dynamics <i>Jay Robinson</i>	Will Intel Own the Workstation Business? <i>Dr. Thomas Copeland</i>	Internet Servers of the 21st Century <i>Susan Franklin • Mark Winters</i>
TRACK 4	TRACK 4	TRACK 4
Opportunity in Networked Software <i>Dr. Anthony Pearl</i>	Where's the Leverage Database or Applications? <i>Gary Gilson • Dan Karsenty</i>	Can Network Break Microsoft's Monopoly? <i>David Card</i>
TRACK 5	TRACK 5	TRACK 5
Developing Channel Partnerships for Superior Service Delivery <i>Traci Bar</i>	Marketing Desktop Services: Hidden Opportunities <i>Kurt Johnson</i>	Strategizing in the Era of the Knowledge Marketplace <i>To Be Announced</i>
TRACK 6	TRACK 6	TRACK 6
Worldwide IT Market Outlook <i>Philippe de Marillac</i>	Network Computing Challenges in Latin America <i>Paul J. Pastorek</i>	IT Market Restructuring in the Asia/Pacific Region <i>Doris Blair</i>

CLOSING SESSION - 3:55 - 4:40

- **Industry Call-To-Action**
Dr. Robert Metcalfe, Vice President of Technology, IDC; Inventor of Ethernet

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Viewpoint

Editorial

Defending limits

Censorship to a journalist is like speed limits to a driver on the autobahn: an outrageous government intrusion on the right to be free.

So why do I find myself fundamentally agreeing with the restrictions on indecency contained in the Communications Decency Act? Because the computer industry has painted itself into a corner, and legislation may be the only way to gracefully find a way out.

In the interest of selling more products to home users, the industry has lobbied for years to make a computer with a modem a necessity in every family room; kids who don't have one will miss out on their education. PC makers argue. Well, it's working. Nearly 40% of U.S. homes have PCs. But with the explosion in home computing comes the dark side of information access: Kids can dig in to the seamy side of the Internet with the same ease as visiting the Barney page.

As the parent of two young kids, I find this alarming. I can no more watch what they're doing every minute on-line than I can regulate what their classmates say on the playground. Someone has to be the mediator. And I doubt it's going to be the computer industry.



Ironically, few people argue against the laws that prohibit minors from buying skin magazines at the 7-11 or that make it a crime to make threatening or obscene telephone calls. What's so different about applying the same limits to downloading material from alt.sex binaries or prosecuting nutcases who solicit sex from kids via E-mail? Free-speech advocates argue that the restrictions contained in the telecom law are too harsh and that the law can be interpreted to prohibit discussions of abortion or breast cancer. That may be true, but I doubt any reasonable judge would take the terms that literally. Most Americans are comfortable with letting the courts define what is obscene.

Ideally, on-line service providers would take the lead in regulating themselves. If bulletin board operators, service providers and academic institutions made a voluntary commitment to verify the identity of their users so that offensive material could be traced, the industry could take back the initiative from the government. But that's not going to happen in a business that's too busy growing to think much about self-regulation.

I'm no fan of government intrusion on our private lives. But telecom reform may be the only way to stave off a bigger backlash from parents who are increasingly alarmed about the dark side of universal access.

Paul Gillin, Editor
Internet: paul.gillin@cw.com
<http://www.ultranet.com/~pgillin>



Letters to the editor

Crypto restrictions aren't absolute

In Gary Anthes' article on encryption ["Standard encryption vulnerable to attack," CW, Feb. 12], he refers to the export restrictions that the U.S. government has imposed on certain encryption products.

The restrictions apply if the banking industry intended to sell those products. U.S. organizations can use these strong crypto products outside the U.S. as long as they get the proper license from the U.S. Department of State. This license also applies to U.S. individuals who travel abroad with encrypted files in their portable computers and to certain cellular telephone instruments.

Another approach would be to buy the necessary crypto product from a foreign supplier. A survey completed in mid-1995 identified more than 300 crypto products available in 35 countries; more than half used the Data Encryption Standard.

Edwin B. Heinlein
Accoin Products & Services, Inc.
San Francisco

Hooked on Java?

I just read the article concerning Sun's new line of Java chips [News Shorts, CW, Feb. 5]. Frankly, I don't see the problem.

The language has been out for some time and has already proved itself a good cross-platform system. Why does the introduction of a set of chips to optimize Java's behavior suddenly make it proprietary? Do others feel that Sun is going to get people "hooked" on Java and then change it so it works only on their

Don't forget OS/2

Regarding "No easy decision on Win 95 vs. NT" [CW, Feb. 5], there has been an easy choice for a number of years now. It's called OS/2. It is free of any concerns about flavors, migration or direction. It seems sad that, in a world in which "open" was a means to salvation, you should emphasize accounts in which "closed" seems a dominant principle.

It is a pity that your perspective lacks the breadth of your readership's experience. Would that only you could grow so that we could mutually benefit.

Lynn H. Maxson
Tertialink, Inc.
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chip set? Since Sun has already agreed to license the language, that seems unlikely. It is perfectly reasonable for Sun to try to optimize its systems to run the language it created. It's created a good thing; now let [Sun] make it even better.

Eddie Sheffield Jr.
Sheffield Computer Consulting
Glade Spring, Va.
esheffield@nass.com

Add Apple to the 'human touch' list

"See me, feel me, touch me, heal me" [CW, Feb. 5] says that vendors such as Intuit, Microsoft, Sun and

AST are attempting to make computing a lot more human.

Uhhh... and Apple! It's not dead yet! Considering the role that some of the named vendors played in making the interfaces so inhuman in the first place, it's an awfully irresponsible bit of journalism to not mention Apple.

Also notably absent from mention was General Magic, which of course was spawned by former Apple executives.

Please take a moment to correct your thinking.

Keith Gardner
J. Crew, Inc.
New York
keithg@bway.net

Those year changes are so confusing

Your "official vaporware list" [CW, Jan. 22] has Apple's Copland as being vapor for 20 months. Yet on page 24, you note that Copland was announced last May, which would make it vapor for only eight months.

Since your list was based on announcement dates, isn't the eight-month figure correct? Or has the year 2000 confusion run rampant on your calculations?

Dan Kittay
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Computerworld welcomes comments from its readers. Letters should not exceed 200 words and should be addressed to Paul Gillin, Editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax number: (508) 875-8931; Internet: letters@cw.com. Please include an address and phone number for verification.

Michael Cohn

One pitfall of data mining: Data 'mine'-ing

This is getting ridiculous. You don't want it. You don't need it. Data warehousing is a hoax! When someone starts slinging stuff about enterprise modeling and data visualization, run the other way.

Sure, I've read all the come-ons: "Use data as a competitive asset," the vendors and consultants say. "Turn information 'islands' into business intelligence. Drill down. Tie together." Hogwash!

We've had data for decades. Mainframes have spit out more reports, numbers and pounds of paper than you can shake a stick at. No one's disappointed. No one's complaining. Folks have more greenbar printouts on their desks than they have time to read. They don't need more data. Build a data warehouse? I'd turn back if I were you, for the following reasons:

Obstacles. First, if you think folks will share their data, you're kidding yourself. The first obstacle you'll face is pathetically possessive users — those who suffer from data *mine*-ing. Second, warehousing is logistically complex. You've probably got data hiding all over the place. Leave it alone; it wasn't bothering anybody. Poke at it, and you'll discover it's in different formats and on incompatible platforms. You'll find data updated in *real time*, while you access it in *near time* with queries that run for a *long time*.

Then you've got to grapple with size. There are PDBs (parallel databases), VLDBs (very large databases) and the inevitable IWTGSLDBs (it-

wasn't-supposed-to-get-so-large databases). When you toss in terms such as on-line analytical processing, replication and hypercubed multidimensional databases, it's enough to make you want to hit the next buzzword-blurting consultant with a two-by-four.



Metadata. Who came up with this? Data about data? Give me a break. I've been in this business 15 years and never even used it to impress a user. Besides, users don't want metadata — they just want *betta* data.

Not-so-hidden costs. The final straw is mon-

ey. Don't scam your stockholders with visions of returns on investment and market intelligence. After you've acquired a data warehouse administrator, a decision-support application manager, an enterprise architect, user-interface experts, a few dozen new servers and enough fiber and bandwidth to choke a horse, you'll likely join the legion of Fortune 1,000 companies that a) are implementing a data warehouse this year, and b) were a Fortune 500 company last year.

I don't want to sound like a cynic. Maybe you can pull it off. You might get the thing to work in a year or six. Submit a query — and then watch the lights dim for several city blocks as your data warehouse pounds through the stuff. It will miraculously tell you that the customers who buy three-ring binders also tend to buy those little plastic things that say "this side to sheets." Eureka.

There may be a salesman or two who finds fault with this analysis, arguing that you need a data warehouse — it's "strategic" — please sign here. But don't do it. We've survived with flat files. We've done just fine with ISAM, VSAM and, push come to shove, an RDBMS or two. But stay away from data warehousing. There are a thousand reasons why you don't need it. I just wish someone would come up with an easy way to drill down and find them all.

Cohn works for a large computer company in Atlanta. He's still convinced Unix is just a fad.



Users won't share the data, which is in different formats anyway.

Michael D. Lips

You're working Feb. 29; are your systems?

Shortly after Feb. 29, 1988, a supermarket was fined \$1,000 for having meat around one day too long. The problem was traced to a computer program that didn't adjust for the leap year.

Peter G. Neumann's book *Computer-Related Risks* cites this and other anecdotes from the Leap Year Hall of Shame, including computer systems from around the world that crashed in 1992. Sometimes the problems didn't even show up until year's end, such as a network of automated teller machines that crashed at midnight Dec. 31, 1992.

These may seem like quaint stories of leap-days gone by, but I predict a new wave of problems this year. That's right, 1996 is a leap year. By virtue of the "every-four-years" calendar rule taught in grade school, February has a 29th day. But this leap year is a piece of cake compared with the rapidly approaching year 2000, when two lesser-known calendar rules also kick in.

The original four-year rule was defined in 46 B.C. by Julius Caesar to adjust for the one-quarter day left over at the end of each year. An extra day was created every four years, thereby expanding the Julian Calendar from 365 to 366 days.

However, the length of the year isn't exactly 365.25 days but rather closer to 365.2422. By the 16th century, the resulting round-off error had ac-

cumulated to the point where the Roman Catholic Church became seriously concerned. Pope Gregory XIII was worried that religious holidays weren't being celebrated on exactly the right day. He commissioned an astronomer, Aloysius Lilius, and his brother to see how severe the problem had become. Their conclusion: The calendar was off by 10 days.

To correct the problem, Pope Gregory did two things. To eliminate future errors, he created two new leap-year rules — a 100-year rule that excludes century years and a 400-year rule that re-includes them. In other words, 1900 wasn't a leap year, 2000 will be and 2100 won't be.

Then, Pope Gregory XIII decreed a "one-time correction" of 10 days. As a result, Thursday, Oct. 4, 1582, was followed by Friday, Oct. 15, 1582. All together, this is known as the Gregorian Calendar.

Naturally, not all countries adopted the standard at the same time. Great Britain and France reportedly spent years meeting each other, in battle, on unplanned and inopportune occasions. When Great Britain finally got around to adopting the standard in 1752, 11 days of error had accumulated (which explains why some reports said George Washington was born Feb. 11 and others said he was born Feb. 22).

Now, Feb. 29, 1996 is only three days away, and it's likely that many companies will experience at least one leap-year glitch. If we can't handle simple date logic every four years, how can we expect to handle more complex logic in the year 2000, when all three leap-year rules come into play? Some programs only implement the four-year and 100-year rules and therefore won't recognize 2000 as a leap year. Other programs won't even bother looking because they check only for the hard-coded values of 88, 92 and 96, and not 00. Still, others will properly recognize 2000 as a leap year but will improperly assign February a very generous 30 days.

Of course, this is small potatoes compared with the well-known "year 2000 problem," which involves programs that interpret 00 as 1900. Our systems are riddled with a variety of faulty date logic of all sorts — and much of it is going to get stress-tested in production in the next few years.

Because faulty calculations put our critical business systems at grave risk, we must always try to implement the best date logic possible. Date logic is the foundation on which many of our business systems are built. If we don't lay the foundation carefully, the systems may collapse. And I doubt that we'll get bailed out by papal decree.

Lips is president of TransCentury Data Systems in San Francisco.



Here's the colorful tale of how a pope's calendar fixes may crash your system.

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This is an easy one.
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leap-day of the year
2000.

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Software will help users diagnose and resolve common PC hardware and software problems, 44

Servers & PCs

DLT faces Mammoth competition on servers

By Bob Francis

To help back up PC data, systems administrators are turning to digital linear tape (DLT), a technology that originally was developed for minicomputers.

For companies that are moving vital applications to large PC servers, DLT lets systems

Tape backup

managers back up their data quickly and on a reliable medium. Most users rely on digital audio tape (DAT) drives for their smaller PC servers and large desktop systems. DAT drives often are slower and have less capacity — about 4G bytes per tape — when compared with DLT, which has at least 20G bytes per cartridge.

DLT was developed by Digital Equipment Corp. in Maynard,

Mass., for its minicomputers.

"We went with DLT as the amount of data increased on our PC servers. It was a proven technology on minicomputer platforms, and we needed something reliable," said David Blanchard, a systems analyst at Quaker Oats Co. in Chicago.

PC server powerhouse Compaq Computer Corp. last month boosted DLT's legitimacy on the PC server platform when it announced a DLT tape array that offers more than 210G bytes of storage and software that will let data backups be completed in less than five hours.

Analysts said Compaq's move to DLT was just a matter of time. "Compaq is only doing what's becoming obvious, which is how big and how important these PC server applications have become,"

Shipments increase

IDC projects shipments of DLT systems for PC servers will increase to 39,500 this year, up from 26,400 last year.

said John Dunkle, president of Workgroup Strategic Services, Inc. in Portsmouth, N.H.

DLT may be challenged by a new 8mm tape-drive technology that will hit the market next month. Exabyte Corp. in Boulder, Colo., will release Mammoth, a high-performance drive that offers 20G bytes of capacity with a sustained throughput of 3M byte/sec. Both features are equal to DLT technology.

DLT uses a linear recording system and a precise tape guide to record data on the tapes. Exa-

byte's Mammoth drive uses a helical scan recording system.

Mammoth will face a stiff climb, according to Stan Corker, an analyst at International Data Corp. (IDC) in Framingham, Mass. "The biggest problem is that DLT has become so established as a backup technology for PC servers," he said.

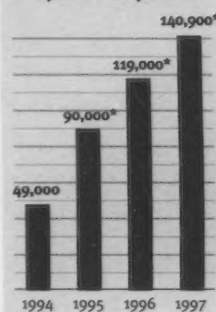
Mammoth may have one payoff for users: Exabyte and Quantum Corp. in Milpitas, Calif., are expected to compete on tape-drive pricing. Pricing for the Mammoth drive hasn't been set. DLT drives currently cost a little more than \$2,000. Quantum acquired the DLT technology from Digital in 1994 and this year, plans to increase that capacity to 30G bytes.

DLT's increased capacity is a strong selling point, but another factor in the product's success is

backup speed, which is now at 3M byte/sec. This is considerably higher than the speed of current 8mm tape drives, DLT's strongest competition.

Besides Compaq, several other companies have licensed DLT, including NetFrame Systems, Inc. and Storage Dimensions, Inc., both in Milpitas, Calif. Storage Dimensions earlier this month at UniForum '96 announced the DLT4700, which is a 280G-byte DLT library.

Digital linear tape unit shipments



*Projected

Source: International Data Corp., Framingham, Mass.

Chips, MIPS, clips under the 'Big Top'

Culling the real news from the carnival-like hype of San Francisco trade show

By Craig Stedman

Magicians (Unisys Corp.), comedy improvisation troupes (SCO, Inc.) and transparently insincere hucksters (IBM) were out in full force at UniForum '96 this month in San Francisco. But amidst all the hokey trade show trappings, some actual news was announced.

This year, for sure

IBM said a long-promised upgrade of its PowerPC 604 chip should ship this summer for the multiprocessor versions of its RS/6000 servers. The 604, which was supposed to be available on those machines last year, can run up to 30% faster than the PowerPC 601 chip the company currently uses. Users are owed free upgrades to the 604; they should start seeing those in the second quarter, said Jeff Mason,

vice president of worldwide marketing at IBM's RS/6000 Division. Volume shipments of 604-based systems should follow in the third quarter.

Wait and see

Hewlett-Packard Co. in March will announce plans for a second-quarter release of servers that are based on its new 64-bit PA-8000 microprocessor. But HP won't commit to a specific shipment date until it sees what archival Sun Microsystems, Inc. has up its 64-bit sleeve a month later. Sun in mid-April will introduce servers that are built around its 64-bit UltraSPARC chip, which is already available in workstations.

New IBM hybrid

IBM in the second quarter will

ship a hybrid system that bundles a CMOS-based mainframe processor board into its low-end

UniForum '96

RS/6000 C20 server. The R390 is targeted at application development and at offloading small mainframe workloads from old big-iron boxes. IBM shipped a similar hybrid based on a PC server a year ago.

Unix unification?

NEC Corp. and most other supporters of Silicon Graphics, Inc.'s MIPS architecture announced plans to embrace the 64-bit Unix that HP and SCO will deliver in 1998. But SGI isn't joining the porting party now. SGI's higher-volume and technical focus makes standardizing on a single Unix less crucial than it is for other MIPS vendors, NEC officials said.

Elvis fans

UniForum must harbor some Elvis Costello fans. Songs by the bilious Brit blasted over the sound system after keynotes by IBM's Lou Gerstner and Sun's Scott McNealy. The choice after Gerstner's talk was a bit curious: "Oliver's Army," a song about British mercenaries with the lyrics, "I would rather be anywhere else but here today." McNealy's speech was followed by the more apropos "Pump It Up."

Takingshots

The specter of Windows NT haunted UniForum, and a lot of shots were fired at Microsoft Corp. in an effort to stake out the open systems high ground. For example, Gerstner apologized for IBM's days as a bastion of proprietary systems. "But it turns out we're not the last bastion left," he said in a pointed ref-

erence toward Microsoft. McNealy described NT as "freedom from choice," and UniForum president Michael Tilson said the organization welcomes technologies that support open systems standards, "be they mainframes or Microsoft." Feeling heat from Redmond, guys?

Video stars

More keynote hijinks: After greeting his "fellow Unix lovers," HP's Lew Platt was interrupted briefly by a heckler from a janitors' union. McNealy's introduction was in the form of a music video; he and other Sun executives cavorted on a rooftop in leather and sunglasses while an homage to Sun blasted away to the tune of Stevie Wonder's "Higher Ground." The highlight came when the executives kicked some SGI boxes off the roof.

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Key #19750

Servers & PCs

HP uses X terminals to enter 'net market

By Michael Goldberg

X terminals may be the hatchbacks of the desktop. Only now, Hewlett-Packard Co. has installed mag wheels and chrome trim for users looking to cruise down Internet Strip.

HP is offering multimedia versions of its Envisex and Entria lines, with color monitors up to 20 inches wide, MPEG video cards and audio capabilities. HP seeks to recast its X terminals to compete in the still-nascent market of Internet access stations.

The machines are aimed at corporate users and can access Unix and legacy applications.

The X terminals use Intel Corp.'s 1960 processors and cost from \$2,000 to \$5,400. Observers said these terminals are generally less expensive and easier to manage than PCs on a LAN because they don't contain the disk storage for applications software or the processing power of regular PCs.

With network connections to the HP 500 Windows application server, the Envisex, for technical users, and the Entria, for commercial sites, also access Windows applications. Internet access comes through a server that is fitted with the proper software.

Analysts praised HP's efforts as a sav-

vy way to reposition an older product with new Internet-ready features. But observers cautioned that the market for "thin clients" is potentially exciting but still uncharted. For example, no one knows whether Sun Microsystems, Inc.'s planned \$500 Internet device will launch a computing model or whether a consumer electronics product such as Sony, Inc.'s Playstation is better suited to lead the way.

Hot item

"You're going to see a tsunami of activity here for a device that is far less complex than a stand-alone PC that you'd use to run your applications," said Ron Blatnick, vice president at Zona Research, Inc. in Mountain View, Calif. He said the demand for this kind of technology could make X terminals an important alternative be-

Five types of devices are expected to provide access to the Internet and the Web:

1. General purpose PCs
2. Internet PCs — the heralded "\$500 Internet appliance"
3. Internet terminals such as X terminals geared up with multimedia capabilities
4. Handheld devices such as the Sony Playstation
5. Set-top boxes, like the ones for cable television, to make TVs Internet-accessible

Source: International Data Corp., Framingham, Mass.

cause "with the impact of the Internet or intranet, [end users] don't know where information resides, and they don't care."

User reaction shows that HP has some work to do to convince X terminal sites that they need multimedia displays and World Wide Web access at desktops that run Unix applications.

Potential Internet access from X terminals "doesn't have anything to do with us," said Shelley Miles, president of USAnimation, Inc. in Los Angeles. The firm makes digital

animation applications.

But Vish Bhat at Pratt & Whitney Canada, Inc. in Montreal, said his engineering firm's plans to build intranet connections would make him look at the revved-up Envisex models.

"It would certainly be useful. Our drawings and internal documents could be done faster. We'd have to look at the cost," Bhat said. He is head of computational fluid dynamics at an engineering group that uses 600 Unix workstations and 300 X terminals.

From X to Sun

Along with its refreshed X terminals, HP is marketing systems management software called Enware. One of Enware's new features provides X terminal access to Sun servers.

Help desk in a box for Win 95, NT

Artificial intelligence engine helps diagnose, solve problems

By Jaikumar Vijayan

A new product will give PC users an onboard help desk.

SystemSoft Corp., a Natick, Mass.-based vendor of system-level software, is developing a Windows 95 and Windows NT-based package that can automatically identify, diagnose and resolve common PC hardware, software and system

configuration problems.

Users of PCs equipped with the software will be able to automatically solve problems, such as a sound card configuration issue or a General Protection Fault, without help from technical support staff.

"It is a terrific idea. It's the kind of thing that a lot of users are looking for," said Chad Pearce, vice president of systems at Godwins Booke & Dickinson, an accounting firm in Philadelphia.

SystemSoft's Call Avoidance software will be licensed to hardware OEMs for bundling with their systems. It is being developed with funding from Digital Equipment Corp. and Intel Corp.

"This really represents the wave of the future in terms of how people will get the support they need," said Robert Johnson, an analyst at Dataquest, Inc. in Westboro, Mass.

Reaching a new level

Other tools have done what Call Avoidance will do, Johnson said, but "what SystemSoft is attempting to do is new to the industry in terms of scope and scale."

Call Avoidance is an integrated package that contains a wide knowledge base of general and system-specific hardware problems — and resolutions to those

Ask the 'net

Additional products being developed by SystemSoft will take advantage of the Internet. If a problem can't be resolved locally, the PC can automatically access and download much larger and updated knowledge bases from remote system vendor sites via the Internet.

problems — culled from Digital's multivendor customer support group.

Built in to the package is an artificial intelligence engine that determines the cause of a specific problem and resolves it. The software takes advantage of system data available through Windows 95 or NT registries, the Plug and Play BIOS and other system data files to help diagnose and resolve problems.

The product is expected to be released in the second quarter, and PCs incorporating the package are likely to ship by year's end, according to SystemSoft officials.



1982

New Products

Advanced Software Products Group, Inc. has introduced Date/2000 2.0, a product for adapting IBM MVS applications for the year 2000 date change.

According to the Naples, Fla., company, the product scans sources for date-related data names and provides reports for each program.

Pricing starts at \$8,900.

► **Advanced Software Products**
(941) 649-1548

TEAC America, Inc. has begun shipping the TEAC Tape800 and Tape1600 internal tape drives.

According to the Montebello, Calif., company, TEAC Tape800 uses Travan TR-1 minicartridge technology to achieve a compressed capacity of 800M bytes. The TEAC Tape1600 uses 2-to-1 compression of TR-2 tape cartridges to achieve a compressed capacity of 1.6G bytes, or 800M bytes uncompressed.

TEAC Tape800 costs \$149. TEAC Tape1600 costs \$179.

► **TEAC America**
(213) 726-0303

CreatePrint of America has introduced CreateFax 1.3, an integrated fax system that works with CreatePrint electronic forms software for IBM's AS/400.

According to the Canoga Park, Calif., company, CreateFax 1.3

lets users at AS/400 terminals send high-quality faxes, including purchase orders, invoices, quotations, and reports, anywhere in the world.

It was designed to monitor the output queue and merge data with selected forms. It monitors the status of a fax throughout the process and provides this information to any AS/400 terminal. It also can split a print file containing invoices or purchase orders into individual faxes.

Pricing for CreateFax 1.3 starts at \$6,500.

► **CreatePrint of America**
(818) 992-4028

Micro Design International, Inc. has introduced SCSI Express Model SE2600S, a 2.6G-byte magnetooptical drive.

According to the Winter Park, Fla., company, Model SE2600S offers expanded capacity with high performance and reliability. It complies with optical standards and provides backward compatibility with 1.3G-byte media and 650M-byte media. It was designed for desktop and networked environments.

Model SE2600S features fast disk rotation speed of 3,000 rpm, resulting in a sustained transfer rate of 1.7 to 3.4M byte/sec. It offers both rewritable and write-once-read-many technologies.

Pricing for SCSI Express SE2600S starts at \$3,395.

► **Micro Design International**
(407) 677-8333

An example of how Call Avoidance software works

The problem

You've just installed a popular DOS game on your new PC. The background music works fine when playing the game, but other sounds don't seem to work.

The fix

1. Call Avoidance automatically examines the system and determines there is a conflict with the port that the sound card needs to use.
2. The software reassigns the card to an open port and reloads the game.
3. Total time for the fix is under 2 minutes, according to SystemSoft.



Is there ever a

good time

?

Finding the perfect time to migrate

is like finding the perfect time to mow the lawn.

However, finding the perfect reason is easy: value.

Upgrades have value insofar as they deliver dramatic improvements.

Improvements that outweigh the cost of deployment.

With the Microsoft® Windows® 95 operating system,

that value is demonstrable. And in what follows, we'll show you how it,

and the 32-bit applications that run on it, can reduce your support burden,

increase your control over the desktop,

and improve the productivity of end users.

In short, we'll address the issues that tend to forestall serious evaluation.

We'll even go so far as to suggest that waiting has costs of its own.

Support for IS.

Support for system administrators begins with support for end users. With its simplified interface, Windows 95 allows users to work far more independently than in the past. Simply put, the greater their autonomy, the less time you spend answering obvious questions.

But it's not just the interface that's improved; the whole system is more reliable. Thanks to the 32-bit protect-mode components of Windows 95, users can run

multiple applications at the same time, without running out of system resources or freezing-up their PCs. The same is true even if a network server goes down. And, with 32-bit applications now able to run in their own memory space, the likelihood of one app crashing another is almost nil.

What's the upshot of all this? Well, it won't exactly turn you into the Maytag repairman, but it can cut helpdesk calls by 7 to 14% a year.¹

Still, in designing a new OS, we realized that to make things easy for the end-user at the expense of the IS department would be self-defeating. And to that end, Windows 95 offers a variety of powerful tools to help you better manage your network and your time.

Built into Windows 95 are a number of tools to simplify administration. 32-bit versions of popular network clients,

like Novell® NetWare® are included, as is support for standard transport protocols like TCP/IP and device standards. Plug and Play support detects hardware devices as they are added to the system, which makes installation a snap. And, with Server-based Setup and Batch Setup tools, it's now possible to install and configure Windows 95 on multiple desktops from a server. Automatically.

Once you're wired, you can monitor performance and troubleshoot problems from a central location.

More support: more control.

System Policies in Windows 95 allow you to specify system settings and restrict network access and security privileges from a central location. So you can lock down desktop configurations whenever you see fit. And with User Profiles, individual users' desktop configurations are available wherever they log on to the network. This lets multiple users share one computer and "roving" users log on to other networked computers, while maintaining their own personal settings.

Again, with Windows 95, all of this can be done from a central location, reducing the number of on-site visits by 30 to 50%.² At last, you'll be able to focus on the big-picture stuff. So the next time someone asks you what's what with this Internet thing, you can say, *I have a plan.*

Productivity from the word Start.

The improved interface in Windows 95 makes nearly everything easier for novice and advanced users alike. Its Start button and task bar make applications more accessible. Long filenames make identifying files easier. Better tools such as Wizards and improved Help make learning features easy. Its right mouse button puts common commands a click away. And now that the separate Program Manager, File Manager, and Print Manager are gone, there are fewer concepts to learn. This makes for able, autonomous, and, dare we say, happy end users. People who require less training and support. Who, in short, can turn the desktop into the most tangible technology investment your company can make.

But Windows 95 isn't just easier, it's more responsive. Basic operations, like printing or accessing a file on a PC or over a network, are faster. And with its 32-bit multitasking capability, users can conduct file searches, online communications, or other tasks all while, say, editing a document. In fact, studies show that once users are familiar with the new OS, they're able to accomplish many tasks in about half the time it took under Windows 3.1.³

Of course, no one spends their entire day tooling around in their operating system. People have work to do. With that



Today you can turn the desktop into the most tangible technology investment your company can make.



1. Technology Business Research, Inc., a market research firm, collected and analyzed the helpdesk logs of 10 Fortune 100 companies in order to project the impact of Windows 95 on call avoidance, problem resolution, and on-site call reduction. The logs represented 100,000 PC users and 1.5 million helpdesk calls per year. 2. Technology Business Research, Inc. 3. To quantify the learning curve from Windows 3.1 to Windows 95, and evaluate user productivity on Windows 95, Usability Sciences Corporation, an independent usability testing organization, had 75 beginner, intermediate, and advanced Windows 3.1 users complete tasks with both operating systems. They found that users were 91% more productive with Windows 95, and 94% more accurate. Tasks performed included: finding and opening files and programs, copying and moving files, and switching between active programs. 4. The MASIE Center, a recognized software training center and think-tank found that only one hour of briefing and

The prevailing wisdom and why, this time, you should ignore it.

Common sense tells you to hold off on making the move to Windows 95, to wait until someone else finds the bugs. Well, someone else already has. With the largest beta program in history, Windows 95 was installed on more than a million desktops worldwide. Now, just six months into its commercial release, thousands of organizations are in pilot and rollout. And to keep them current, we've put together an online Service Pack with the latest drivers and other new components. In short, the dreaded "1.0 version" has already come and gone.

in mind, no evaluation of Windows 95 would be complete without simultaneously evaluating some of the 32-bit applications designed for it, such as Microsoft Office for Windows 95.

Now users can focus on their work instead of their software.

Office 95 is more than just fresh features on top of Office 4.x. It's a deeply integrated suite of applications. Integrated, both with the operating system and with each other. Because users can leverage their knowledge of one application throughout the entire suite, they need only three hours of training to be effective in all of them.⁴ Needless to say, this can dramatically reduce training costs.

But what about support? While it's one thing to get PC users up and running, it's quite another to teach them all the skills they'll ever need. And of course, you can't; users simply aren't interested. (Remember? They've got work to do.) Knowing this has made all the difference in designing Office 95. It's resulted in advances such as the Answer Wizard, which lets users ask the computer plain English questions like, *How do I print sideways?*, and then shows them exactly how to do it. As a result, you can expect a 48% reduction in Office-related help calls.⁵

With Office 95, users are not only able to work on their own, they're able to accomplish more things faster. Labor-saving features such as updated AutoFormat and Spell-It in Word, and enhanced AutoComplete in Microsoft Excel, not only render everyday tasks automatically, they do so accurately. According to Kelly Services, the folks who train and supply corporations with over 325,000 office professionals each year, users complete their tasks 37% faster with Office 95. And they're 36% more accurate in doing so.⁶ Not a bad day at the office.



configurations, lab tests, pilot programs, rollout — it takes time. And if the goal is to decide *Is it worth it?* and you continue to put off serious evaluation, it'll be that much longer before you begin to realize the productivity gains and cost savings that Windows 95 and Office 95 have to offer.

But let's assume you upgraded today. How long would it take to recoup your migration costs? According to a leading consulting firm, Office 95 will pay for itself in 10 months in medium-sized companies, and 12 months in large organizations.⁷ Factor in the increase in end user productivity, and those numbers fall by nearly half.

No question about it, the move to 32-bits is a big one. But as part of the larger evolution in chip architecture, hardware platforms, and application support, it's not one that you or Microsoft is making alone. Won't you join us?

How to start.

To receive a free copy of Trial 95 — including guides for evaluation and deployment, resource kits, feature reviews, and, of course, copies of both Windows 95 and Office for Windows 95, each with a 90 day license — call (800) 583-0042, Dept. A017. Or visit our Web site at www.microsoft.com. All the backup for the studies cited here is included, along with an ROI modeling tool so you can plug in your own numbers.

Why sooner is better than later.

If, as the headline says, there's never a good time to migrate, why make the move now? Why? Because deployment takes time.

Product reviews, network

Windows 95 or Windows NT™ Workstation? Yes.

Both products are strategic for your organization. Together they make it possible for you to deploy Win32™-based applications, reduce your support costs, and make your end-users more productive — across all your desktops. The right mix for your organization will depend on your business needs and constraints. For guidelines on how to pick the right mix, go to www.microsoft.com/windows/mix.

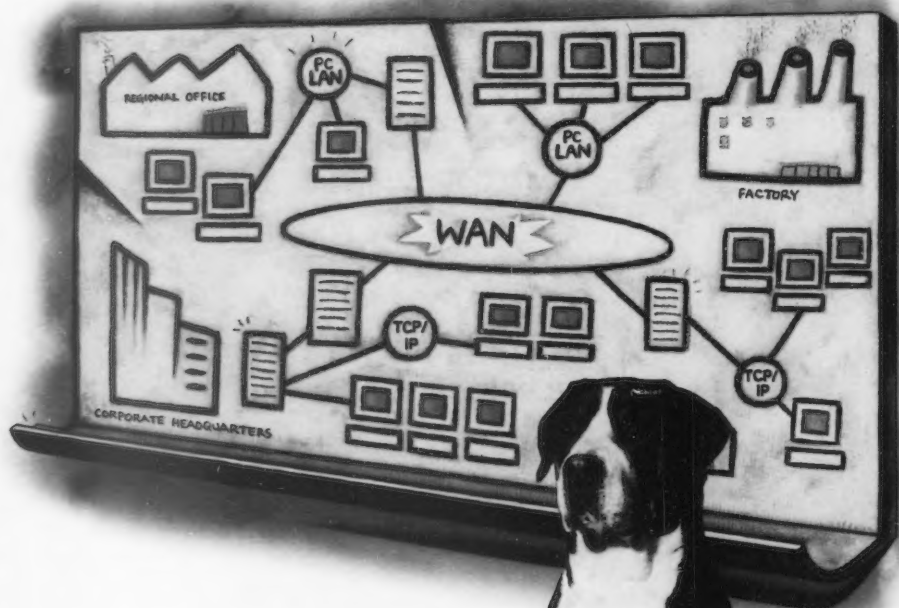
Microsoft

WHERE DO YOU WANT TO GO TODAY?™

two hours of self-discovery were required to migrate Office 4.3 users to Office 95. ⁵Technology Business Research, Inc. ⁶Kelly Services, Inc. conducted a controlled usability study of 35 employees who regularly use Office 4.3. Participants were measured for speed and accuracy in completing commonly performed tasks. ⁷International Data Corporation modeled the expected returns on investment of Office 95 for large companies (1,000+ PCs) and for small-to-medium companies (100 PCs). On a cost-to-use basis, large companies will see their investment paid for in 12 months, small companies in 10. On a value-to-use basis, those figures drop substantially: 4.8 months for large companies, 5.3 months for small. © 1996 Microsoft Corporation. All rights reserved. Microsoft, Windows and Win32 are registered trademarks and Windows NT, the Windows Start logo, and Where do you want to go today? are trademarks of Microsoft. Novell and NetWare are registered trademarks of Novell, Inc.

Network can teach you
a few new tricks.

Sun Educational Services. If you've ever wanted to make network computing work for your company, we can show you how. We teach more people about the UNIX® operating system and network computing than anyone else. In fact, we train over 50,000 customers around the world every year. And we're the only company entirely dedicated to enterprise network computing. So we're uniquely qualified to help your people make the right long-term decisions. Sun Educational Services. Part of the full range of business support offered by SunService. To learn more, contact us on the Internet at <http://www.sun.com/sunservice/suned> or call 1-800-422-8020. And start getting some answers right away.



Network →

 **SunService**
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A Closer Look: Unix, OS/2 hold their ground against NT, 54

Software

THE PAPER AND INK USED IN THE ORIGINAL PUBLICATION MAY AFFECT THE QUALITY OF THE MICROFORM EDITION.

49

Software

Client/server grows up and out

By Julia King

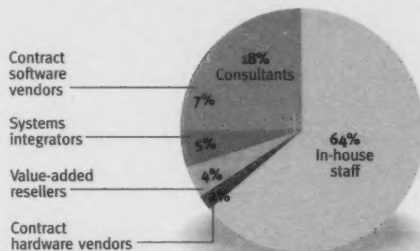
Start small and keep a low profile. Five years ago, that was state-of-the-art advice for companies that embarked on client/server projects.

Not anymore. Buoyed by increasingly sophisticated application packages and a wealth of new system development and network management tools, many organizations have decided that bigger is better.

Consider the following:

- The Department of Defense plans to manage personnel records for 800,000 civilian workers and another 1.2 million Air Force personnel by using Oracle Corp.'s human resources package. When it is completed in 1998, the system will encompass 1,000 servers, making it the largest client/server deployment in the Air Force.

Fortune 1,000 companies expect to deploy 230,000 new business-critical applications based on client/server between 1995 and 1997. A breakdown of who will actually do the work is as follows:



Base: 367 Fortune 1,000 companies

Source: The Standish Group International, Inc., Dennis, Mass.

- The Department of Veteran Affairs is implementing PeopleSoft, Inc.'s human resources package to track more than 250,000 employees at 230 locations nationwide.

- On the commercial front, large companies are basing global corporate standards on packaged applications. Recent examples include deployments at Alco Corp. in Pittsburgh and Kellogg Co. in Battle Creek, Mich. Both firms use Data-logix International, Inc.'s suite of manufacturing applications.

Companies are also building large, custom client/server systems for mission-critical applications and often are completing much of the design and development work in-house, according to Sandy Taylor, a market analyst at The Standish

Half of everything

This year, large companies' client/server budgets will grow 28%. Overall, client/server spending will make up 50% of all software spending, according to Sentry Market Research in Westboro, Mass.

Group International, Inc., a market research firm in Dennis, Mass. (see chart).

"[In] the next two years, 230,000 business-critical applications in North America" will be deployed, Taylor said. "The pioneering days are over." The 230,000 new applications will use a combination of packaged software and proprietary technology.

Package pull

What has changed most since 1990 is the number of client/server tools available and their broadened functionality, industry observers said.

"A few years back, we wouldn't have even considered a packaged application. They just weren't refined enough," said Jim Densberger, technical director of personnel data systems at the Defense Department.

Advances in graphical user interfaces and object-oriented icons, for example, make packaged software a viable alternative to developing systems from scratch. "Hewlett-Packard Co.'s OpenView is another example of a tool that just wasn't where we needed it to be five years ago," but today, it has functions such as advanced configuration management that make large-scale deployments

feasible, Densberger said.

Once Internet-enabled applications now on the drawing board become available, large-scale client/server deployments also should become much cheaper, according to Brian Sommer, worldwide director of software intelligence at Andersen Consulting in Chicago.

Internet-enabled business application software — which is in the works at SAP AG, PeopleSoft and Oracle — can be accessed by users with a World Wide Web browser rather than a PC-based client that is laden down with a traditional application's access and presentation software.

"That means the cost to install the software on any desktop device would only be about \$39," Sommer said.

Components may sour users on software suites

More vendors to offer mix-and-match wares

By Lisa Picarille

The availability of off-the-shelf, component-based software will increase during the next two years and should greatly affect how users purchase software, industry watchers expect.

The promise of component software is that all parts will work together seamlessly, no matter which vendor you buy them from. This would allow users to mix and match components, buying only the features they need, to create their own customized applications or suites of products.

For example, users could build their own word processor by buying a spell checker object from one vendor, a text editing component from another vendor and a chunk of code that generates only tables from yet another vendor.

Initially, these components will probably come from small vendors, industry watchers said. But eventually, the larger applications vendors will undoubtedly need to supply these pieces as well.

One user said he liked the idea of buying just the pieces he needs.

"I would prefer that my word processor and other applications get smaller but not lose the func-

tionality," said Lee Stone, the de facto network administrator at Ace Industries, Inc., a Norcross, Ga., construction equipment company. "It's not a contradiction. I want applets or objects that I can buy on a per-use basis."

But the reality is that the only objects available right now are OCKs (objects based on Microsoft Corp.'s OLE) and a handful of OpenDoc parts.

This movement toward components may not be good news for vendors such as Microsoft or Lotus Development Corp., which make their money by selling suites, or integrated packages of productivity software (see chart, page 52).

Reeling them in

"First, they get users hooked on their word processor, and then they sell them an entire suite of products," said Nicole Miller, an analyst at International Data Corp., a market research firm in Mountain View, Calif.

For the vendors to sell components, they would have to break apart their suites of office applications, and this approach "just may burst the office bubble," said Chris Le Tocq, an analyst at Data-

Components, page 52

Top application software vendors worldwide by revenue

Snapshot

Vendor	1994	1995	1994 to 1995 growth rate	1995 market share
Microsoft	\$1.7B	\$2.5B	47.1%	6.2%
IBM	\$1.6B	\$1.7B	6.5%	4.3%
SAP AG	\$843M	\$1.3B	56.9%	3.3%
IBM/Lotus	\$401M	\$540M	34.6%	1.4%
Computer Associates*	\$425M	\$478M	12.5%	1.2%
Total market revenue	\$34.9B	\$40B	14.5%	—

*Includes revenue from Legent Corp.

All dollar amounts are rounded

Source: International Data Corp., Framingham, Mass.

(http://www.computerworld.com) FEBRUARY 26, 1996 COMPUTERWORLD



**Imagine changing a tire
at over 200 miles an hour.**

An unreasonable demand? If you're an IS manager, you face the equivalent every day. And tomorrow, you may be asked to replace the engine. Or change the transmission. And don't forget, your business can't slow down. Fortunately, there's ObjectStar,[™] software that makes the impossible possible. ObjectStar allows you to replace, enhance or incrementally renew your business-critical applications. And quickly move or distribute them wherever they are needed.



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Start-up rolls out multitier system

Offers tool for building high-end client/server apps

By Frank Hayes

Tool kits for building enterprise-class distributed systems have been difficult to use. A start-up hopes to change all that.

Most corporate information systems shops have built simple client/server applications using low-end tool sets such as PowerBuilder from Sybase, Inc.'s PowerSoft subsidiary, Visual Basic from Microsoft Corp. and SQLWindows from Gupta Corp.

But building large-scale enterprise applications is something else again. Only a few large organizations are using development systems from vendors such as Forte Software, Inc. in Oakland, Calif., and Dynasty Technologies, Inc. in Naperville, Ill.

What's on tap

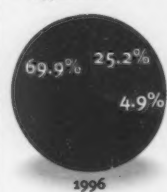
Hoping to make it easier for users to jump on the high-end client/server bandwagon, Nat Systems International, Inc. in McLean, Va., last week began shipping NatStar, a version of the company's client/server rapid development system for Windows, OS/2 and Unix.

The \$8,500 system lets developers build multitier applications by writing only a minimum of code and configure those applications

Won't shed a tier

Corporate IS departments predict they will begin to implement three-tier applications over the next two years

- Non-client/server applications
- Two-tier client/server applications
- Three-tier client/server applications



Base: 652 IS respondents

Source: Strategic Focus, Milpitas, Calif.

on the fly, users said.

"NatStar allows a user to specify a complete application using a class model but without defining the target platforms," said Patrick

Castagna, who is responsible for platform engineering at Assurances Generales de France, a leading French insurance firm.

Developers use a series of visual tools to define data architectures and program flow. Then the application can be partitioned among client and server platforms, and NatStar automatically generates code and compiles it on each platform.

Unlike its rivals, NatStar also allows users to make minor changes to the application without recompiling it.

Although individual modules are compiled from C code, users can modify the program's logical flow between modules at runtime. The system can also be set up to locate and install any modules when the program is run. But only the flow of logic, not elements such as the data architecture, can be easily changed, Castagna said.

Nat, the U.S. unit of the French firm Nat Systems in Paris, set up shop in the U.S. in November.

"The real issue with any of these tools is which one of these companies is going to be around next year," said Gregory Tyson, assistant vice president and director of technical architecture at The Equitable Cos. in New York. Nat, with over 300 customers using the system for transaction processing applications, seems a surer bet than Forte and Dynasty, whose users are just beginning to roll out production applications, he said. Equitable is a Nat user.

A developer's resource list

Books

♦ **Visual Basic 4 Nuts and Bolts: For Experienced Programmers** by Gary Cornell and Troy Strain; Osborne/McGraw-Hill, Berkeley, Calif.; 338 pages; \$24.95.

The book's title says it all: This is for professionals; don't try this at home. The reader doesn't necessarily have to know Visual Basic but does need to know the basics of programming to get maximum use from this book. The target reader is a programmer who wants to learn Visual Basic. Topics include designing a form, error handling, debugging, objects and OLE and advanced programming features.

♦ **Teach Yourself Visual Basic** by Bob Albrecht and Karl Albrecht; Osborne/McGraw-Hill, Berkeley, Calif.; 512 pages; \$24.95.

Unlike the book above, this one is meant for beginners, including those who are new to any kind of Windows programming. Still, it isn't certain that someone who has never heard programming

terms would be able to follow this book without guidance from a more experienced colleague. Chapters include exploring the Visual Basic environment; using forms and command buttons in simple projects, loops and switchbacks; using procedures, data arrays and variables; and using constants.

CD-ROMs

♦ **C & C++ Cyber Classroom; Prentice Hall, New York; \$69.95.**

This training tool, based on college textbooks, is intended for programmers who want to teach themselves new skills as well as corporations that want to train a bunch of folks en masse.

It is an interactive CD-ROM, the developers claim, with four hours of audio, 4,000 hyperlinked index entries, more than 300 programs and 500 exercises with answers. Users can follow video instructions, hear audio clips and find warnings, tips and tricks.

—Johanna Ambrosio

Briefs

Blyth Software to put Omniss on OS/2

Blyth Software, Inc. in Foster City, Calif., will port its Omniss client/server development system to OS/2 by this summer as part of a deal with IBM. The agreement will also result in a PowerPC version of Omniss for OS/2 later this year. IBM and Blyth will jointly develop training, consulting and vertical market programs. Prices for the new versions of Omniss haven't been set.

Lotus offers help with project organization

Lotus Development Corp. will release the application programming interface for Organizer 2.1 to developers. This will let developers create applications that can pull information such as addresses or appointments out of the Personal Information Manager software. For example, project management software could

extract task lists from Organizer without the user's reentering the information.

Rogue Wave ships DBFactory

Rogue Wave Software, Inc. in Corvallis, Ore., recently rolled out DBFactory, a graphical code generator that automatically creates C++ classes from database structures. DBFactory runs under Windows NT and costs \$995 for a single-user license. It lets developers use a mouse to select database elements and operations to incorporate in each class, which makes it easier to build database interfaces in C++. Versions for other Windows platforms and Unix will be available by March.

CA ships kit for CA-Unicenter

Computer Associates International, Inc. has begun shipping a software developer's kit for CA-Unicenter/TNG, a forthcoming three-dimensional, object-oriented version of the vendor's systems management package.

Components may sour users on suites

CONTINUED FROM PAGE 49

quest, Inc., a San Jose, Calif., market research firm.

Single-vendor virtues

But on the other hand, Stone wants the comfort of buying from a single vendor. "It gives me more confidence that the products are more likely to work together," he said.

But industry watchers said that once users realize these components really do work together, they will jump on the bandwagon.

"As organizations become more aware of what they actually need in terms of features and functionality, they will start to buy more intelligently and see the value of objects," Le Tocq predicted.

Suites market share

	1994	1995
Microsoft Office for Windows	62.3%	90%
Microsoft Office Professional for Windows	22.1%	NA
Lotus SmartSuite	14.3%	4.6%
Borland Office for Windows (Novell/WordPerfect products)	0.3%	NA
Borland Office for Windows (Borland products)	0.1%	NA
Novell PerfectOffice	NA	5.4%
Total worldwide revenue	\$1.7 billion	\$2.9 billion

NA = Products not available

Source: Dataquest, Inc., San Jose, Calif.

If you exclude
the time it takes to learn, the money that it
takes to train, the elusive reuse benefits, the
resistance to change, the constantly arising
trouble spots, the long lead times required
to build applications from scratch, complex
low-level programming languages, lack of
scalability, the shortage of talent, limited
platform support, the performance penalties,
deployment challenges, heavy maintenance,
difficulty in comprehension, and the expense
of manually reapplying your customizations,
object technology is quite beneficial.

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Software

Unix, OS/2 hold their ground against NT

By Stuart J. Johnston

In the cacophony over Microsoft Corp.'s Windows 95 and Windows NT, it is easy to overlook other operating systems that are alive and well in corporate America.

Among them are IBM's OS/2 and the various flavors of Unix, which continue to multiply. Although industry research firms don't keep track of the installed base for Unix, they do track year-to-year change.

Last year, for example, Unix sales in the server market increased 4.6% compared with 1994, while sales of desktop/workstation units increased by 5.5%, according to projections by industry researcher International Data Corp. (IDC) in Mountain View, Calif.

That translates into nearly 500,000 Unix server shipments last year and 900,000 Unix desktops, according to IDC's projections.

At the same time, OS/2 sales expanded by almost 23% on servers, for a total of 280,000 new units, and by 9.9% on the desktop, for a total of 3.2 million units.

NT sales grew by 216% on the server and 134% on the desktop last year. However, NT's actual sales numbers for last year were smaller than for Unix or OS/2. Microsoft sold only 363,000 units of NT Server and 489,000 units of NT Workstation.

Unix has been gradually worming its way into enterprise computing systems and slowly eroding some of the mainframe's role as the main repository for corporate data, said Tony Iams, a research analyst at D. H. Brown Associates, a research firm in Port Chester, N.Y.

Unix also remains strong in its traditional niches — the technical, scientific and engineering workstation markets, analysts said.

Unix machines can be clustered to magnify their power, while NT machines can't — not yet anyway. As long as that remains true, Unix will continue to own much of the high ground in enterprise markets, according to analysts and industry insiders.

Some customers are saving by buying NT-based Intel Corp. machines as technical workstations instead of the more expensive

Unix-based RISC boxes, said Jean S. Bozeman, research manager at IDC.

"Over the next three to five years, NT will eat away at the technical workstation markets," said Tom Willmott, vice president of Aberdeen Group, Inc., a research firm in Boston.

Unix converts

But even some dyed-in-the-wool Windows shops still see the benefits of using Unix in niche areas.

Menlo Park, Calif.-based Sequus Pharmaceuticals, Inc. has chosen Windows 95 on the desktop and NT on servers. But the company also has a pair of Sun Microsystems, Inc. Solaris-based servers that run medical systems and laboratory analysis packages that aren't available on NT, said Randy Dugger, director of IS.

Early on, OS/2 became known for robust and secure multitasking as well as some key applications such as Notes that were available only on that platform.

That proved a boon for companies that decided to move to client/server technology before that trend caught on. For instance, Fireman's Fund Insurance Co. in Novato, Calif., committed to OS/2 more than six years ago.

"In the late 1980s, OS/2 was the only operating system in town that could support our mission-critical needs on the client side," said Robert O'Brien, systems adviser at Fireman's Fund.

Fireman's Fund is happy with its OS/2

investment and will remain committed to the operating system for the foreseeable future, O'Brien said.

If Fireman's Fund were starting from scratch today, however, it would have to look seriously at NT, O'Brien conceded.

Even IBM acknowledges that it isn't likely to gain much ground in the short term against the Microsoft juggernaut, according to John Schwarz, vice president of marketing at IBM's Personal Software Products group.

"If you look at the corporate desktop, there are two classes," Schwarz said. One is general productivity, and "clearly Microsoft has a very convincing lead in that market." The second class is mission-critical applications, and here, IBM is "a 45% to 50% player," he added.

Therefore, IBM will concentrate on building OS/2 in markets where it has a significant presence, Schwarz said. Those include mission-critical and custom applications in areas such as finance, insurance, telecommunications, manufacturing, distribution, government and transportation in both client and server markets.

Schwarz said the company views Notes, which it now owns, as a critical selling point for OS/2. Indeed, IBM will release a comprehensive communications server, OS/2 Warp Server, this week.

The firm also plans to release a server suite bundle code-named Project Eagle. It includes Notes Server for OS/2, in the first half, according to an IBM spokesman.



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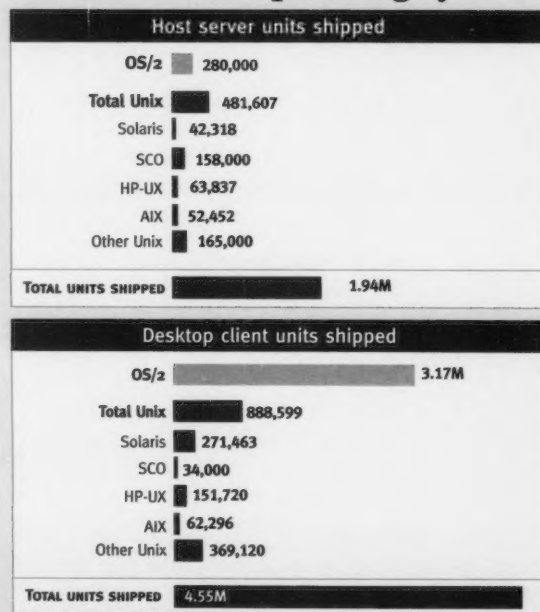
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Source: International Data Corp., Framingham, Mass.

New Products

Fujitsu Systems Business of America, Inc. has introduced LiveHelp, help desk remote control software.

According to the Santa Clara, Calif., company, LiveHelp gives help desk personnel remote control and screen-sharing capabilities for real-time, on-line support and training. LiveHelp was designed to let help desks teach users, guide them to answers and cut down on repetitious help calls. Users also can pass a complex help call to a more knowledgeable expert.

Remote users can access LiveHelp through LANs, WANs and modem connectivity. The product includes drawing tools and whiteboard functions and operates on Windows 3.1 and Windows 95.

Pricing for LiveHelp clients starts at \$1,750 for a 10-user pack.

► **Fujitsu Systems Business of America**
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Rhode Island Soft Systems, Inc. has unveiled TrueType Signature Fonts.

According to the Woonsocket, R.I., company, the product can create a scalable font of an individual's signature that can be incorporated into word processing documents, faxes, mail-merge documents and form letters.

Signatures can be divided so that only a first name is printed.

TrueType Signature Fonts cost \$75 per signature.

► **Rhode Island Soft Systems**
(401) 767-3106

Insight Software Solutions, Inc. has introduced Zip Express, a ZIP code reference tool for Windows applications.

According to the Bountiful, Utah, company, Zip Express is a lookup/auto-paste product that lets users automatically search by ZIP code, city, county or state. It also can be used as a background program that lets users paste ZIP code information directly into a Windows application.

Zip Express costs \$40.
► **Insight Software Solutions**
(801) 295-1890

PKWare, Inc. has unveiled PKZip 2.0 for Windows, a data compression utility.

According to the Brown Deer, Wis., company, PKZip 2.0 for Windows is a 16-bit program that lets users compress graphic and data files to save hard-disk space.

The product was designed to let users drag and drop files from a file manager or the Windows 95 explorer into PKZip. Users

also can create and extract archived files. Users can open multiple archived files, encrypt passwords on files and exclude files and directories when they create a file.

PKZip 2.0 costs \$29.
► **PKWare**
(414) 354-8699

Software Publishing Corp. has announced ASAP WordPower 1.95.

According to the San Jose, Calif., firm,

the product transforms word processing files into visual presentations. It lets users drag and drop layouts and features 22 layout choices and transition effects.

ASAP WordPower 1.95 costs \$99.
► **Software Publishing**
(408) 537-3000

MapInfo Corp. has introduced MapInfo Desktop, mapping software.

According to the Troy, N.Y., company

MapInfo Desktop lets users incorporate desktop mapping into work processes by dropping map objects into applications. It includes more than 300M bytes of worldwide demographic data, statistics and maps.

MapInfo Desktop costs \$349 and runs on Windows 3.x, Windows 95 and Windows NT.

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Agile package
simplifies VLAN
management, 60

The Enterprise Network

NII Testbed sounds alarm

By Gary H. Anthes

Loss of public support for the National Information Infrastructure (NII) ultimately would lead to the economic decline of the U.S., the NII Testbed warned.

The NII Testbed, a consortium of 48 companies, universities and national laboratories, said jokes about the "information superhighway" and the "National Illusionary Infrastructure" are the result of a dearth of concrete examples of how the NII can address real national challenges.

In a report, "The Unfinished Business of the NII," the consortium urged users to join with product and service vendors to develop network-based applications that improve productivity (see related story

below). The applications must be useful to others and capable of replication in other environments, according to the report.

"I think there's been too much emphasis on things like how can you pass a credit card securely over the Internet," said Ken Crutchfield, a staff consultant at The Dun & Bradstreet Corp. "I can't even find anything I want to buy yet."

Crutchfield, director of electronic commerce applications for the NII Testbed, said companies spend a lot of time developing technology but neglect the legal and cultural barriers to using the NII.

Just one slice

The Internet is just one component of the NII. It also includes the supporting infrastructure of hardware and software, database contents and other communications systems that move data and connect to the Internet, the consortium said.

The private, nonprofit NII Testbed was founded in 1993 to develop pilot projects that will accelerate the development of the NII. So far it has launched several projects in fields such as manufacturing, health care, retailing and environmental protection.

For example, the consortium may accelerate deployment of interactive video in hospitals. NII Testbed member Denver Health and Hospitals is setting up two-way video telemedicine links between trauma specialists at Denver General Hospital and facilities elsewhere in Colorado.

The hospital already has network connections to the suburban Arapahoe County Jail; the connections have reduced face-to-face contact between physicians and

What is the greatest potential benefit of the National Information Infrastructure?



- Will boost competitiveness of U.S. companies
- Will improve U.S. work-force through access to training and education
- Will improve government and public services
- Will provide consumer services to the home

Base: 48 members of the National Information Infrastructure Testbed

Source: National Information Infrastructure Testbed, Denver

inmates by 95% and saved \$24,000 in transportation costs in two months.

According to Dr. Allan Liebgott, director of telemedicine at the hospital, telemedicine is "highly satisfactory" to patients 70% to 90% of the time. "But medical professionals are much more skeptical and cynical than the public about this."

Liebgott said professionals worry about confidentiality and licensing issues when they practice across state lines.

Industry holds the key to NII growth

Unlike other countries, such as Japan, the U.S. isn't developing the NII with public funds.

Therefore, it is up to industry to make the business case for it, the NII Testbed consortium said.

That requires investing in application testbeds that build a popular constituency for government actions such as strengthening intellectual property rights and removing burdensome laws and regulations, the group said.

The NII Testbed isn't the only user-oriented group singing the praises of the NII. "Although the information highway structure is still in the concept state, it is clear that businesses will be one of the major benefactors of, and contributors to, the highway's capabilities," according to a recent statement by the Society for Information Management (SIM).

SIM has launched a program devoted to fostering the development of the NII for business users. It pledges to do the following:

- Provide advice to, and shape the benefits of the NII for, U.S. enterprises.
- Ensure that applications benefit consumers and taxpayers.
- Endorse standards that are in the best interests of users rather than service providers. — Gary H. Anthes

What is the greatest challenge to the Internet's development?

Inadequate security

41%

Inadequate quality of service

23%

Difficult to use

19%

Lack of bandwidth

17%

Base: 48 members of the National Information Infrastructure Testbed

Source: National Information Infrastructure Testbed, Denver

Bandwagon for public groupware networks fills up

By Tim Ouellette

Users who want groupware without the pain of maintaining it will get more choices this year.

Lotus Development Corp.'s Notes is the best known of these efforts, through its alliance with AT&T Corp.'s Network Notes. Users typically opt for Network Notes instead of rolling their own Notes setups to avoid the costs of building and maintaining a groupware infrastructure.

"I look at AT&T Network Notes as outsourcing. I'd rather them do it," said Jody Lane, president of TitleLink in Dallas. Notes also is available from

third-party providers via WorldCom, an international Notes network, and CompuServe, Inc.'s Enterprise Information Link. The following products are on the way:

- BT's Network for Lotus Notes will be available throughout Europe this month.
- IBM's Global Network will provide general availability for Notes by May.
- US West Communications, Inc. and Bell Global Solutions of Canada are piloting Notes services.

More enhancements

Meanwhile, Microsoft Corp. and Novell, Inc. have similar plans for their groupware prod-

ucts. Microsoft inked a deal with MCI Communications Corp. late last month; it includes offering MCI Network subscriber access to Microsoft's Ex-

change Server, which is due to ship this quarter. Novell officials said they plan to offer similar services for Groupwise XTD, which is expected to ship by

midyear.

But industry watchers say the World Wide Web could steal users away from these public groupware networks.

Networking Notes

More on-line service providers such as AT&T are offering groupware features that help improve intercompany applications. Some reasons to subscribe to an on-line Notes service include:

- A high amount of Notes traffic going outside the LAN
- Large, geographically dispersed workgroups
- Communication with a large number of customers and suppliers
- A lack of internal Notes server administration resources
- Plans include expanding the number of Notes users without additional network resources and staff

Trouble ahead?

"I still haven't been convinced at this late date that there is an opportunity" for Network Notes and the like, said Eric Arnun, editor of "Electronic Mail & Messaging Systems," a newsletter in Washington. "The Web is flattening the on-line services industry in general, one service after another."

Public groupware networks can fill a gap, he said, by offering business applications to go

Groupware, page 60

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The Enterprise Network

Package streamlines VLAN management

By Bob Wallace

ATM start-up Agile Networks recently announced a switch/management package that automates the long and arduous process of creating and managing virtual LANs.

Virtual LANs (VLAN) are logical, not physical, networks. They enable network managers to create workgroups of users who need to communicate and access common resources regardless of the physical network they use. Network managers, for example, could create one workgroup for manufacturing, one for administrators and one that links all executives.

Agile's ATMizer switch builds VLANs automatically. Network administrators assign a network address to each device linked to

the ATM switch. The devices then broadcast relevant data across the network to the switch, and the VLANs are built.

Although almost every major switch vendor has promised switch and software that automates the creation of VLANs, Agile was the first to deliver. Its wares let users move throughout a network without leaving their VLAN. That means users can move anywhere in the company and still remain part of the original VLAN without additional programming.

One user at an Agile beta site lauded the package.

"We desperately needed to automate the creation and simplify management of VLANs," said Tony Fortenberry, a telecommunications analyst at the University of Mississippi in Oxford. The

school has a fairly small staff but still needs to support its students, faculty and staff who move around and need to connect to the network at any location, he added.

Fortenberry evaluated similar promised offerings from Cabletron Systems, Inc., Bay Networks, Inc., Cisco Systems, Inc. and start-up Xylan Corp. At the time of his testing, "No one had as fully an automated approach as Agile," he said. "Although some had the hardware, most didn't have the software completed and ready to go."

Less convenience

Other switch vendors offer some level of VLAN support, but most would have required Fortenberry to manually create a database of all users by media access control address and then manually drag

ATMman	
Description:	An object-oriented SNMP-based management application for use with Agile ATMizer ATM switch
Platforms supported:	SPARCstation or HP workstation
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Disk space:	100M bytes
Availability:	Now
Price:	Starts at \$1,500

and drop them — using a graphical screen and icons — into the VLANs.

One analyst said Agile's VLAN technology is unique. "Agile is providing a totally different approach from everyone except for Xylan, which is just rolling [something similar] out," said Eric Hindin, a program director at The Yankee Group, a Boston consultancy.

In the Agile scheme, the information from all network devices is fed from the ATMizer switch to the vendor's ATMman management package. This lets network managers create policies, or rules

that govern what users can and can't do on the network. They include, for example, the ability to log on from any machine on the network vs. logging on from one specific computer only.

The Simple Network Management Protocol-based network management package runs on Unix workstations from Sun Microsystems, Inc. and Hewlett-Packard Co. and is available under HP's OpenView network management system. The vendor has no immediate plans for PC versions.

ATMman is available now; prices start at \$1,500.

Management tools address NetWare needs

By Patrick Dryden

Many network supervisors get a warm and fuzzy feeling about Novell, Inc.'s NetWare because they grew up in that operating system environment. But all appreciate the wealth of management tools that the market leader attracts.

Already mature products continue to gain enhancements, and new options pop up from the following start-ups and overseas companies:

- Last week **Alexander LAN, Inc.** in Nashua, N.H., launched Version 2.0 of its Server Protection Kit. The software automatically diagnoses NetWare servers to help prevent failure and resurrects crashed systems to reduce downtime.

The kit's three components offer improved automation to help local or remote engineers deal with crises involving servers that run NetWare Versions 3.11

through 4.10.

The emergency diagnostics program takes over after a crash to analyze conditions and store them in a file. Now it offers new options for restarting the server and sending its reports to internal or vendor support staff.

The NetCheck program can prevent common crashes, and the extended debugger improves evaluation during server post-mortem exams. It costs \$698 per server.

- The SysMaster line from **Loan System** in Creteil, France, made its U.S. debut at Networks Expo in Boston recently. This performance management suite monitors NetWare, Unix and Windows NT servers from a single console.

Loan System initially targets just NetWare 3.x and 4.x servers in North America, but the company promises the other versions as

soon as it establishes support here. SysLoad for NetWare 4.0 is available from two consulting and outsourcing companies: NCN, Inc. in Phoenix and CompuDesign Group, Inc. in Calgary, Alberta. It is priced at \$995 for 25 concurrent users.

Management applications

SysLoad tracks server resource use by users, groups and applications. It offers numerous options

for monitoring, displaying and handling events to help administrators spot trends and troubleshoot problems.

- **BindView Development Corp.** in Houston updated BindView for NDS, its suite of tools for monitoring NetWare 4.x servers and all objects in the NetWare Directory Services (NDS) tree.

Version 4.0C adds two dozen enhancements for analyzing NetWare security, including a "rights

map" that shows how one object inherits rights to others on the NDS tree. Also, administrators can analyze disk space usage by groups of users across the entire NDS tree. It costs \$595 per server and \$495 for the monitoring console.

- **Knozall Systems, Inc.** in Chandler, Ariz., improved NLMerlin 3, its job-scheduling and scripting tool for NetWare servers and stations.

Now central administrators can write jobs centrally and schedule them to run on remote, disconnected LANs via a dial-up link. Other enhancements expand job-control options and transfer files to stations in background mode. NLMerlin 3 starts at \$2,395.

Knozall Systems also promised in March support for NDS and an integrated file-compression utility.

- **Measurement Techniques, Inc.** in Stoughton, Mass.,

launched LANTest Benchmark Software to help troubleshooters isolate the cause of network performance problems from the user end.

The LANTest suite runs on a DOS or Windows-based PC station to check network subsystems from that station's perspective. No probes or protocol analyzers are required.

Performance tests begin locally with the processor, memory and I/O for disk and network and then involve the servers and routers of LAN or WAN segments. Graphic displays identify possible problems and suggest solutions.

The LANTest introductory price is \$25.

Measurement Techniques developed the benchmark tools to demonstrate performance improvements made possible by another product. Shared LAN Cache is station-based cache software that helps improve server performance and decrease network use by off-loading frequently requested files to the station itself.

Groupware

CONTINUED FROM PAGE 57

with their infrastructure and network support.

For example, TitleLink provides a real estate title application of the same name for AT&T Network Notes.

But public groupware networks won't stand still. For instance, Lotus is upgrading the public network version of Notes 4.0 this month to include server clustering, partitioning and use tracking.

This will provide constant server availability, let service providers place more than one customer on a single Notes server and provide statistics for accurate billing.

New Product

Precept Software, Inc. has announced FlashWare, a general-purpose, standards-based software platform for running multimedia on existing networks.

According to the Cupertino, Calif., company, FlashWare lets users transport real-time, syn-

chronized multimedia streams over packet-switched networks. On the sending side of the data path, it takes in data streams, compresses and packets them, and sends them over the network through a WinSock interface TCP/IP protocol stack. On the receiving side, it accepts incoming packets, turns them into frames, decompresses them, synchro-

nizes multiple streams and issues prioritization requests for network resources.

FlashWare is available for Microsoft Corp.'s Windows 3.11. It will be available for Windows 95 and Windows NT in the second quarter. It costs \$249 for the client and \$399 for the server.

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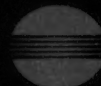
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COMPUTERWORLD

FEBRUARY 26, 1996

Rating 25 of the Largest Systems Integrators

The good the bad and the ugly



An exclusive
Computerworld
survey report

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THE PAPER AND INK USED IN THE ORIGINAL PUBLICATION MAY AFFECT THE QUALITY OF THE MICROFORM EDITION.

GETTING TO KNOW YOUR INTEGRATOR



here are any number of metaphors to describe a company's relationship with a systems integrator. Marriage seems to crop up a lot. Sharing intimacies, working shoulder-to-shoulder and maintaining open communication are all attributes of a sound partnership. When the relationship is going well, life can be very good. But when it breaks down, things can turn ugly.

Computerworld's rating of 25 of the largest systems integrators is intended to help you avoid ugly situations. With our partner, ParaTechnology, Inc., a Bellevue, Wash.-based market research and consulting company, Computerworld surveyed more than 1,000 information systems managers to gauge their level of satisfaction with their integrators. (See pages SI/17 and SI/18 for complete details of the findings and a description of the survey methodology.)

In addition to providing detailed customer satisfaction scores for these leading integrators, this report offers advice and case studies that will help you keep the relationship amicable.

The survey found that some companies, such as AmeriData Technologies, Inc., Unisys Corp. and Hewlett-Packard Co., consistently outperform their rivals in all 22 areas we measured. Others, such as Electronic Data Systems Corp., SHL Systemhouse, Inc. (recently acquired by MCI Communications Corp.), and Computer Sciences Corp. (CSC), don't do quite as well. This report examines why.

Of course, comparing AmeriData with CSC is not entirely apples-to-apples. Indeed, every integrator is different in some respects. For instance, AmeriData, with its origins as a value-added reseller, uses a "bottom-up" approach in its integration business; CSC uses a "top-down"

approach. Top-down companies typically focus on consulting and application development, while bottom-up firms focus on technology implementation. (See "Top-Down vs. Bottom-Up" on page SI/10.)

Another difference is in the size of contracts. More than two-thirds of AmeriData's business comes from contracts of under \$1 million, according to the survey. CSC, on the other hand, derives two-thirds of its business from contracts over \$1 million, with 23% of its contracts in excess of \$10 million. The bigger the project, the more complicated the relationship and the greater the potential for problems. (See "Big Britches" on page SI/7.)

The type or size of the contract notwithstanding, companies use a common set of criteria to evaluate an integrator's performance. More than anything, they expect technical competency, on-time delivery and a reasonable price. When these things are not forthcoming, relations can turn contentious.

The survey found that, to their own detriment, customers typically gloss over some criteria that are vital to the success of a project. For example, few consider conflict resolution and personal relations when selecting an integrator. Yet talk to experienced project managers, and they will insist that a formal conflict resolution mechanism is essential. Without it, communication breaks down, and lawsuits can result. (See "Avoiding the D Word" on page SI/11.)

The bottom line is hardly rocket science: Responsibility for a successful relationship lies with both customer and integrator. Like a marriage, it takes work and constant communication. My hope is that this report will provide a comprehensive picture of the systems integrator relationship. Keep it handy. •

— Bruce Rayner, Editor
Special Projects
Internet: bruce_rayner@cw.com

The Top 10

1. AmeriData Technologies, Inc.
2. Unisys Corp.
3. Hewlett-Packard Co.
4. Control Data Systems, Inc.
5. USConnect, Inc.
6. Price Waterhouse
7. Digital Equipment Corp.
8. Deloitte & Touche
9. The Future Now, Inc.
10. MicroAge, Inc.

Exclusive Computerworld Customer Satisfaction Survey

THE MOST IMPORTANT CRITERIA USED TO EVALUATE AN INTEGRATOR ...

- | | |
|--|-----|
| 1. Integrator's technical expertise | 16% |
| Top ranked: IBM, HP, Unisys | |
| 2. Project's actual completion time vs. scheduled | 10% |
| Top ranked: AmeriData, Price Waterhouse, Unisys | |
| 3. Project's final price relative to performance | 7% |
| Top ranked: USConnect, Unisys, AmeriData | |

...AND THE LEAST IMPORTANT (BUT POTENTIALLY SHOW-STOPPING)

- | | |
|---|----|
| 1. Integrator's problem resolution process | 2% |
| Top ranked: AMS, AmeriData, Control Data | |
| 2. Project's compatibility with other systems | 2% |
| Top ranked: USConnect, AmeriData, Entex | |
| 3. Personal relationship with systems integrator | 1% |
| Top ranked: Unisys, AmeriData, Control Data, | |
| 4. Training provided by systems integrator to company | 1% |
| Top ranked: Deloitte & Touche, AmeriData, Price Waterhouse | |

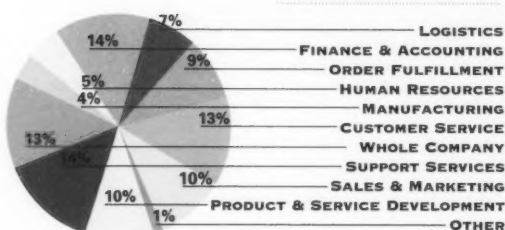
Based on the Computerworld survey question: What are the Top 3 aspects of the systems integration project in terms of importance to you as a customer? (Percent of total respondents.)

THE TOP THREE REASONS FOR USING AN EXTERNAL VENDOR FOR A SYSTEMS INTEGRATION PROJECT, AS OPPOSED TO INTERNAL RESOURCES

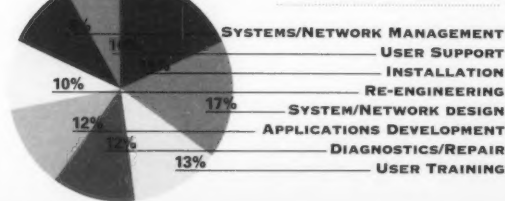
- | | |
|-------------------------------|-----|
| 1. Lack of internal expertise | 25% |
| 2. Lack of internal manpower | 24% |
| 3. Reduce implementation time | 19% |

INTEGRATION PROJECTS AT COMPANIES SURVEYED

FUNCTIONAL AREA



TYPICAL SERVICE



Source: Computerworld and ParaTechnology, Inc.

Who to choose?



By Alan R. Earls

A few years ago, InterGen Co. picked AT&T Corp. as its systems integrator, a decision that turned out to be anything but the right choice. "We worked with them for a little while," says Mark Sternefeld, InterGen's MIS supervisor. "When I asked a question, they would say they would get back to me, but they never did."

Indeed, service proved to be such a serious issue that the Purchase, N.Y.-based biopharmaceuticals company embarked on a series of relationships with other firms. Like many companies, InterGen discovered the hard way that picking a systems integrator is like picking a dance partner — it pays to choose carefully if you want to avoid missteps.

In InterGen's case, experience has brought the company full circle. "We are looking again at AT&T because they do have good technology," Sternefeld admits. InterGen also looked at Sprint Corp. and MCI Communications Corp.

Because so much is at stake in the relationship, it pays to define clearly what you want at the very beginning. A highly structured selection process, with good documentation and contracts, is the only guarantee of long-term success, insists Ioannis Kyrtzoglou, a technical staff member at Mitre Corp. in Bedford, Mass.

As a government-funded research and development firm, Mitre has been both a customer of systems integrators (Unisys Corp., for example) and a middleman in arranging such services, Kyrtzoglou says. That dual role, he says, has given him a lot of experience in choreographing the relationship between systems integrators and their customers.

Kyrtzoglou recommends that companies detail their requirements and goals, have a clear idea of budget limits and, particularly important, possess a well-defined plan for sorting through vendors. "Then you should assemble a group of people, including lawyers, contract people and technical people, to review the candidates," he says.

There are literally hundreds of questions to ask systems integrators. Many are common sense: What is the company's financial and technical viabil-

ity? How well does it follow processes? Is it usually on schedule? What is its technical approach?

BUYING EXPERIENCE

Even when a candidate survives every inquiry you can devise, it is still prudent to document expectations in detailed technical specifications. "We always try to do an in-depth project definition, and then we work with [the systems integrator] to fine-tune our needs," says Paul Maggio, MIS manager at Air Products & Chemicals, Inc. in Calvert City, Ky.

Maggio also looks at the integrator's experience. Currently, Electronic Data Systems Corp. is creating a maintenance and materials management system for Air Products that does everything from inventory control to billing and payroll. Part of the reason EDS got the business: "[It] had done this kind of project before with systems similar to ours," Maggio says.

Proximity is another consideration. Pete Battisti, a vice president of finance at Burleigh Instruments, Inc. in Fishers, N.Y., says a systems integration contract with Digital Equipment Corp. — replacing an outdated VAX-based manufacturing system with a LAN connecting 60 people — has worked well in large part because Digital's local office is only two miles away. "If they can't deal with something on the phone, they are here immediately," he says.

Similarly, Allen Tarbox Jr., director of MIS at the Bank of New Hampshire in Manchester, tossed out a highly regarded national firm when he needed to tie together a new Novell network, electronic-mail software and a number of banking-specific packages. He hired a small, local integrator that could provide the extra attention he demanded.

When the right ingredients are in place, a systems integrator can be a godsend. Tracy Freeman, man-

TIPS FOR SELECTING AN INTEGRATOR

- ✓**Communicate.** This can keep interpersonal or technical problems from becoming irreconcilable differences.
- ✓**Define the project.** Take time to plan and review your project's scope.
- ✓**Flexibility.** Leave room for flexibility if needs change or problems arise.
- ✓**Subcontracting.** Find out if the integrator will do the work or farm it out.
- ✓**Plan for change.** Evaluate and define a project's impact on the organization.
- ✓**Pay for what you get.** Don't pay for a project based on time and materials. Pay for systems that work.
- ✓**Size.** Make sure the integrator is big enough for your project and has offices convenient to you.
- ✓**Reputation.** Place a premium on firms with strong reputations. Ask other IS organizations who they recommend.
- ✓**Leadership.** Find an integrator that can provide a strong project manager.
- ✓**Experience.** Look for integrators with hardware and software know-how.

ager of systems development at Cedar Rapids, Iowa-based Norand Corp., a maker of portable computers, credits Deloitte & Touche with "helping us pinpoint savings and see what the main business functions were that could benefit from new systems."

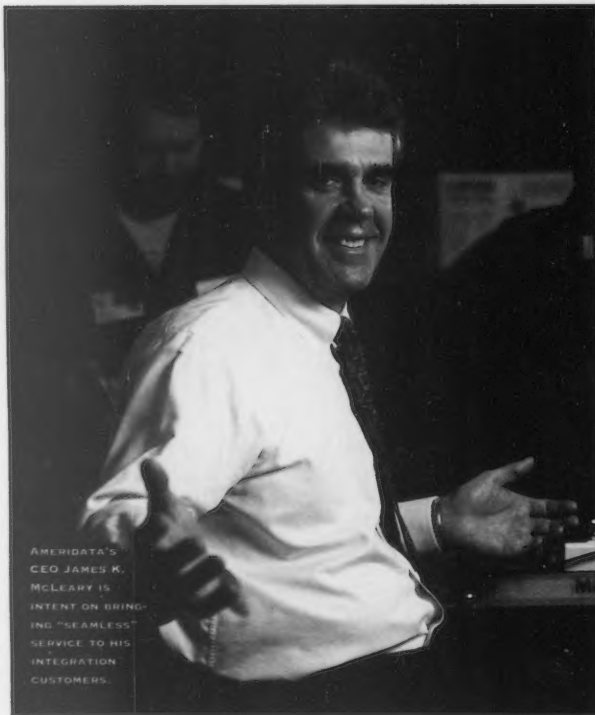
Says Tarbox: "When you rely on someone, you have to have a lot of confidence in them — confidence they have the right people." •

Earls is a freelance writer in Franklin, Mass.

FINDING A SYSTEMS
INTEGRATOR THAT
MEETS YOUR EXPECTATIONS
DEPENDS ON HOW WELL YOU
KNOW THE DANCE
STEPS.

AmeriData Technologies, Inc.

GROWTH THROUGH
ACQUISITION AND A SMART
BUSINESS MODEL BOOST
THIS VALUE-ADDED
DISTRIBUTOR CUM
INTEGRATOR INTO THE
TOP SPOT.



AMERIDATA'S
CEO JAMES K.
MCLEARY IS
INTENT ON BRING-
ING "SEAMLESS"
SERVICE TO HIS
INTEGRATION
CUSTOMERS.



To say AmeriData is growing is like saying the Internet has generated a *little* interest lately. From 1992 revenue of just over \$64 million, the company topped \$1 billion in 1994 — that's a 300% growth rate a year. Revenue projections for 1995 hover around \$1.5 billion.

Much of that growth is due to the company absorbing some 30 independent companies, including consultants, value-added resellers and distributors. Founded in 1968, the company has offices in 130 cities around the world. In the U.S., 70 offices house AmeriData's six distribution centers, 600 salespeople and a total of 2,300 employees, including almost 1,000 consultants, engineers and technicians. Last year, the company acquired part of Control Data Systems, Inc.'s international business for \$34 million, opening new integration opportunities overseas.

"The company is built on a regional business model," says Lee Stagni, AmeriData's vice president of marketing. "Within the regions, we offer configuration integration for our customers as well as higher level consulting — both are driven from the field."

AmeriData's business model has a decidedly protective bent. While most organizations welcome the flexibility and freedom made possible by the PC, they also pine for the old days when a single big vendor — IBM, for example —

handled all the details, says CEO James K. McLeary. "It's that seamless experience that we are trying to bring back for our customers," he says, "while also giving them the freedom of an à la carte menu."

VENDOR OF CHOICE

AmeriData's philosophy and capabilities made a convert of Deborah Hirsch, staff assistant for technology at First National Bank of Maryland in Baltimore. "They have become our vendor of choice for all hardware procurement," she says. "They also provided an integration process for our servers and workstations across 180 locations."

Hirsch uses words like "flexible," "thorough" and "sensitive" to describe AmeriData's performance. "I don't have to give them detailed instructions, because they know what we will want when we decide to upgrade a site." When AmeriData did First National Bank's file-server Roll-out, for example, "it was accomplished without any First National people, and they achieved a 96% accuracy rate."

1994 TOTAL REVENUE:
\$1,018,545,000
1994 INTEGRATION REVENUE*
(SERVICES ONLY): \$69,500,000
INTEGRATION EMPLOYEES: 882
LARGE COMMERCIAL CONTRACTS:
SAMSONITE CORP. (DENVER), NALCO
CHEMICAL CO. (NAPERVILLE, ILL.)
TOPS THE CHARTS: FLEXIBILITY, EASE
OF USE, OVERALL QUALITY, COMPLE-
TION TIME, FINAL PRICE VS. BID, EASE
OF DOING BUSINESS
CHARACTERISTICS: BOTTOM-UP
INTEGRATOR, 10,000 INTEGRATION
CLIENTS

*NORTH AMERICAN

Of course, the approbation is not universal. A CIO at a regional hospital in the Mid-Atlantic States says that his satisfaction with integration work performed by an independent organization that was acquired by AmeriData in April 1995 has dropped. "The service has gone downhill," he says. "We used to get phone calls returned, but now we are a small account, and we are getting short shrift."

While defending its successes, AmeriData admits that melding tiny companies into a coherent whole — and continuing to grow rapidly — hasn't been easy.

But even though a few problems have arisen during the company's massive acquisition binge, many have been avoided, insists Steve Stringer, executive vice president of sales and service, and the man responsible for acquiring and integrating most of AmeriData's business units. "Rather than picking up companies in trouble," he says, "we always looked for successful companies with strong management that fit our business model."

"The key," Stringer adds, "is our regional business model. We don't want a billion dollar corporation dictating how you do business in a regional market. We encourage entrepreneurial flexibility."

THE OTHER SIDE

While many of AmeriData's clients know it first as a systems integrator providing business process re-engineering, database design, project management and training, there is another side to the company — what one analyst dubs its "single-tier distribution strategy."

AmeriData has developed a nationwide computer and peripheral distribution business, with regional distribution centers and \$100 million in inventory at any time. "If you look at the value chain, we begin with product fulfillment where the value-added is low," Stagni says. "Then we build value-added on top of that. In growing our company, we have looked for acquisitions that fit that model."

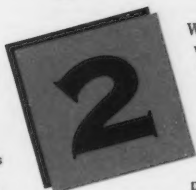
The early acquisitions, Stagni notes, were mostly value-added resellers with turnkey specializations, often in networking. Next came integrators with individual businesses in the \$100 million to \$200 million range. The most recent wave of acquisitions, he says, involved "dealer-based systems integrators" and "some pure network and service firms."

The challenge now, Stagni says, is to provide "intellectual capital" to overseas operations to ensure they grow to their full potential as value-added service providers. *

—Alan R. Earls

Unisys Corp.

EVEN THOUGH
IT SELLS
HARDWARE,
UNISYS FOCUSES
ON DELIVERING
SOLUTIONS.



While still a purveyor of hardware and systems, notably in transaction processing and scalable multiprocessors, Unisys Corp. is seeing most of its growth in services, including consulting, outsourcing, business process re-engineering, and systems integration. Indeed, in recent years, the company's systems integration business — both governmental and commercial — has grown at a rate of more than 40% annually, accounting for \$1.3 billion, or 65% of information services revenue.

"Since we have been the largest supplier of systems integration services to the U.S. government for the past 25 years, we are used to working with other people's equipment," says Paul McGuire, principal, systems architecture, in the Unisys Information Services Group. (In the spring of 1995, Unisys sold its government defense operations to New York-based Loral Corp. And last month, Unisys reorganized into three separate business units: information services, computer systems and customer services.)

Systems integration services — from multivendor integration to solutions development, outsourcing,

consulting, and training — are offered through the Unisys Information Services Group's Worldwide Information Services division. "People are sometimes concerned that we will try to sell them everything that has a Unisys label on it, but this independent structure ensures that won't happen," insists Bob Tumanic, managing principal, who is responsible for Unisys' systems integration practice worldwide.

Indeed, says Gregory S. Merth, IS manager at TruPart Manufacturing Corp., in St. Paul, Minn., and a Unisys integration customer. "They seem to be only interested in finding the solution that fits."

Merth says Unisys' hardware savvy showed through. "They put together a proposal and outlined a budget that they never deviated from. With other integrators, the price seemed to go up and up."

Frank Elvin, operations manager at Elvin Safety Supply, Eden Prairie, Minn., is another satisfied customer. In particular, he credits Unisys with helping him make the most of existing resources in designing and implementing a new LAN- and WAN-based architecture throughout several company locations.

However, while Elvin says he would consider using Unisys again, he tempers his praise with a few qualifiers. "Implementation," he says, "dragged on and on" and the company annoyed him when it sim-



BOB TUMANIC

1994 TOTAL REVENUE: \$5,978,200,000
1994 INTEGRATION REVENUE*
(SERVICES ONLY): \$302,400,000
LARGE COMMERCIAL CONTRACTS: NASDAQ STOCK MARKET (NEW YORK), FORD MOTOR CO. (DETROIT), NATIONWIDE MUTUAL INSURANCE (COLUMBUS, OHIO)
TOPS THE CHARTS: PERSONAL RELATIONSHIPS, INNOVATIVENESS
CHARACTERISTICS: 60,000 INTEGRATION CLIENTS, 32% OF INTEGRATION BUSINESS IS NORTH AMERICAN
*NORTH AMERICAN

ply refused to install equipment linking executives' home-based offices to the WAN. "Maybe I wasn't their biggest customer," he muses.

"Our heritage is doing business with the bigger transport and public sector organizations," Tumanic admits. However, he adds, "as a service provider, we are working hard to go beyond that." •

—Alan R. Earls

Hewlett-Packard Co.

HARDWARE AND
INTEGRATION
GO HAND IN
HAND AT HP.



Unlike some of its hardware brethren, Hewlett-Packard Co. freely admits close ties between its systems integration and hardware businesses.

"It would be pretty unlikely that we would go after a project where there was no HP product content," says Glenn Osaka, general manager of HP's professional services organization, which is based in Mountain View, Calif.

"We are biased to HP technology," Osaka admits, "but one of the advantages is that customers can see our bias. There are firms that say they are [product] independent, but in fact, they have biases."

HP's key vertical markets are manufacturing, telecommunications and financial services; it has a more limited presence in about a dozen other markets ranging from health care to education.

John Comish, manager of microwave products at the ITT Gallium Arsenide Technology Center in Roanoke, Va., confirms HP's skill in the manufacturing market. The wafer fabricator, which is already a

heavy user of HP equipment, hired HP to create an integrated manufacturing system that will tie together islands of automation. The \$3 million project is expected to take 2 1/2 years; installation began in May 1995.

"A couple of times, HP said things we didn't want to believe, but later we had to admit they were right on the money," Comish says. In the networking and database arena, for example, HP recommended a master database, while ITT was working with several databases that did not talk to each other. "HP made it perfectly clear to us that we were creating work by having separate database and data collection systems — work that in some cases was invisible to management," he says.

A medical customer, St. Mary Hospital in Hoboken, N.J., also was pleased with the company's service. HP installed two HP 9000 Unix workstations a year ago and helped the hospital share medical, financial and administrative data with St. Francis Hospital in Jersey City, N.J., over a T1 line using X.25 packet switching.

"HP assisted us in the installation of their Unix operating system and the X.25 hookup and made communications go smoothly between the two hos-



GLENN OSAKA

1994 TOTAL REVENUE: \$25,000,000,000
1994 INTEGRATION REVENUE*
(SERVICES ONLY): \$903,000,000
INTEGRATION EMPLOYEES WORLDWIDE: 5,000
LARGE COMMERCIAL CONTRACTS: WEYERHAEUSER CO. (TACOMA, WASH.), GENERAL ELECTRIC CO. (FAIRFIELD, CONN.), FOXMEYER HEALTH CORP. (CARROLLTON, TEXAS)
TOPS THE CHARTS: TECHNICAL FEATURES, BUSINESS BENEFITS, SERVICE AND SUPPORT
CHARACTERISTICS: SPECIALIZES IN MANUFACTURING AND TELECOMMUNICATIONS CONTRACTS
*NORTH AMERICAN

pitals," says John Servello, PC LAN coordinator at St. Mary. "We actually went live with no problems, and it was done on time." •

—Steve Alexander

Control Data Systems, Inc.

4

A 3 1/2-year-old start-up with a 39-year history. That's how Control Data Systems, Inc., describes itself.

A mainframe maker since 1957, the former Control Data Corp. was threatened with being left behind in

the 1980s by the shift to desktop computing. In 1992, it split into two businesses: Ceridian Corp., an information services company, and Control Data Systems, Inc. (CDS), a systems integrator.

Plans for CDS's future revolve around the desire to be a leader in integration solutions for electronic commerce and product-data management. "If we focus on those areas, we can clearly be in the top two or three [integrators] in the country based on revenue," claims James Ousley, CDS's CEO.

In the product-data management market, for example, CDS developed Metaphase, a data management software product, which has enabled Swedish telecommunications manufacturer Ericsson SpA to run production around the clock and around the world. Ericsson controls all data and tools in product development by using Metaphase 2 and an "Ericsson layer." This added layer allows for communication with the system in terms familiar to Ericsson, says Jan Johansson, Ericsson's executive project leader.

At the start of the relationship between CDS and

Ericsson in early 1995, "we initially were not very happy with the consultancy offerings from CDS, but the situation has improved considerably. At this stage, we are fairly satisfied with their performance," Johansson says.

Ericsson is looking to assign other subprojects to CDS.

Mervyns California is more than satisfied. The department store company hired CDS to remove old point-of-sale terminals and install new ones. The integrator also configured hubs, programmed terminals and integrated new scanners into the terminals.

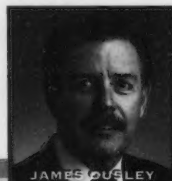
"We were very happy with Control Data," says Paul Weiler, Mervyns' manager of network support. "There were just a minimal number of things that went wrong, and the same thing never went wrong twice."

After completing the project for Mervyns, CDS asked Weiler what they could do to improve. "I was at a loss for words," he says. "I said I couldn't think of anything they could have done differently."

The past three years, however, have not been without some growing pains. In 1993, when CDS acquired Evernet Systems, Inc., Sun Diamond Growers of California suffered when the integrator installed a LAN. "They did things haphazardly, and we've been paying for it for over a year," says Lawrence DeBerry, director of internal audit at Sun Diamond Growers.

"We have really moved away from the LAN integration business and more into the solution business, so there probably were some issues with some of those customers," Ousley explains. •

—Amy Malloy



JAMES OUSLEY

1994 TOTAL REVENUE: \$524,200,000
1994 INTEGRATION REVENUE*
(SERVICES ONLY): \$70,697,860
INTEGRATION EMPLOYEES: 2,100
LARGE COMMERCIAL CONTRACTS:
 NORWEST MORTGAGE (MINNEAPOLIS), FLEET BANK (PROVIDENCE, R.I.), DOW CHEMICAL (MIDLAND, MICH.)
TOPS THE CHARTS: AGGREGATED BUSINESS PRACTICES
CHARACTERISTICS: 60% OF INTEGRATION BUSINESS IS INTERNATIONAL
 *NORTH AMERICAN

FROM MAINFRAME
 MAKER TO SYSTEMS
 INTEGRATOR, CDS
 GIVES AN OLD
 NAME A NEW
 IMAGE.

USConnect, Inc.

5

When Chicago-based Superior Graphite Co. needed to install local-area and wide-area networks, USConnect, Inc., was the obvious choice. Because 85% of its projects involved PC LANs, USConnect had the necessary experience.

It was one of those no-fuss, no-muss type of deals, according to Ron Pawelko, Superior Graphite's treasurer. "I call up and say, 'What kind of hardware do I need?' They tell me, they bring it in and it works."

USConnect, based in Stamford, Conn., is a partnership formed in 1989 by five independent LAN integrators. "They [came together] so they could leverage each other's skills sets and fulfill multisite engagement contracts," explains Brad Whinney, vice president of marketing and business development at USConnect. The company's largest business is in LAN/WAN design and integration.

Every USConnect company, though, does not provide the same services. Some focus solely on systems integration, without offering education services. Others supply strictly application development services, but LAN/WAN remain common denominators in the majority of firms, Whinney says.

Today, the USConnect family includes 26 member firms covering 53 metropolitan areas in the U.S. and

Canada. USConnect approached companies in various cities, which then purchased shares to join the USConnect consortium. Each company uses the USConnect name in conjunction with its own name or a city name. Member companies pay monthly dues in exchange for access to the services of USConnect and fellow members, Whinney explains.

USConnect's reach and expertise made sense for Legal Copies International, Inc. of Atlanta. It hired the integrator to install products such as Netware SFT III from Novell, Inc., build servers and install other software at locations in more than 20 cities.

USConnect impressed Legal Copies with its knowledge of Novell's Netware 4.1 and its willingness to share its expertise with Legal Copies' IS staff, explains Todd Pennington, wide-area systems coordinator at Legal Copies.

There were some problems, too. "We've had our occasional disagreements," Pennington admits. "At times, there has been a lack of speedy response to what we perceive to be emergencies."

USConnect knows that such disagreements generally can be resolved by approaching customer relationships with respect. "The thing that we're focusing on is making sure that [the customer] understands that we are there to support the IS department, and we are not out to compete with them," Whinney says.

Pawelko at Superior Graphite agrees: "They

taught us how to set up the factory in Chicago, and we went in and set up the other factories on our own." •

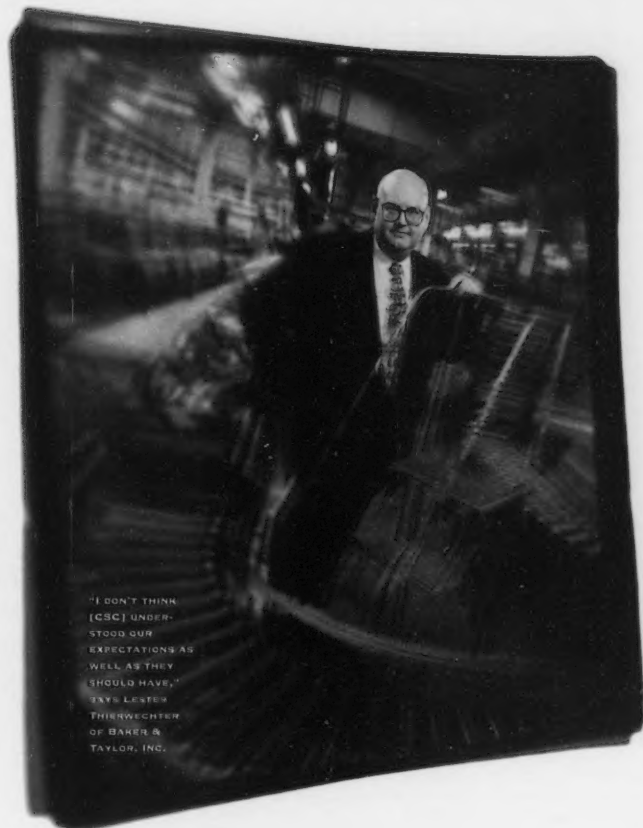
—Amy Malloy



BRAD WHINNEY

1994 TOTAL REVENUE: \$216,000,000
1994 INTEGRATION REVENUE*
(SERVICES ONLY): \$80,676,000
INTEGRATION EMPLOYEES: 1,350
LARGE COMMERCIAL CONTRACTS:
 SPRINT BUSINESS (KANSAS CITY, MO), ELF TECHNOLOGY (MERCER ISLAND, WASH.)
TOPS THE CHARTS: PROJECT'S COMPATIBILITY, INTEGRATION EXPERIENCE, FINAL PRICE RELATIVE TO PERFORMANCE
CHARACTERISTICS: BOTTOM-UP INTEGRATOR, 83% OF BUSINESS IS NORTH AMERICAN
 *NORTH AMERICAN

A FAMILY OF
 INDEPENDENT
 INTEGRATORS
 EXTENDS THE
 REACH OF
 USCONNECT.



"I DON'T THINK [CSC] UNDERSTOOD OUR EXPECTATIONS AS WELL AS THEY SHOULD HAVE," SAYS LESTER THIERWECHTER OF BAKER & TAYLOR, INC.

BIG britches

WHY DO THE LARGEST SYSTEMS
INTEGRATORS IN THE BUSINESS
RANK RELATIVELY LOW IN
CUSTOMER SATISFACTION?

By Julia King

Big is by no means best when it comes to choosing a systems integrator. That's the consensus of customers of some of the billion-dollar integration firms, including Andersen Consulting, Computer Sciences Corp. (CSC) and Electronic Data Systems Corp. In *Computerworld's* customer satisfaction survey of 25 systems integrators, all three companies consistently ranked below their competitors across a range of satisfaction criteria.

Curiously, though, many users who have complaints about these big integrators say their companies probably would hire the same firm again. The reason? Corporate politics.

"It's a golf-course business," insists Tim Bourgeois, an analyst at International Data Corp. in Framingham, Mass. The largest integrators "can all reference big deals that have worked out. So in the end, what it all comes down to is relationships."

For example, when one of the Big Six is involved

in an auditing project at a client company, the company's financial officer frequently will lobby the CEO or another top decision-maker to use that firm on a systems integration project.

Another touchy issue, according to users, is that top executives' reasons for choosing an integrator often are different from business users' and IS staffers' reasons. Executives, some users say, tend to focus more on strategy and business plans, while users want to know about an integrator's spe-

cific skills and its ability to transfer those skills.

Conflicts occur — sometimes deep ones — between customers and the largest of the large systems integrators as projects progress. Specific criticisms raised by users include the following:

- A lack of technical expertise on the part of individual consultants.
- Inflexible project management methodologies.
- Inadequate knowledge transfer or user training.
- Continuous expansion of project scope.
- Inadequate understanding of customers' expectations and requirements.

Consider the case of Baker & Taylor, Inc., a \$600 million book distributor. The Bridgewater, N.J., company is re-engineering its core business systems in a \$20 million to \$30 million contract with CSC in El Segundo, Calif., one of the largest systems integrators in the business.

As of November 1995, what was supposed to be a

Continued on page S1/7

"We thought we were hiring expertise, but we were paying them ... to become trained."

— Mike O'Connor, University of Colorado Hospital Authority

On big jobs, "there is a hell of a lot more opportunity to make someone less than thrilled with you."

Robert "Skip" Savoia, Computer Sciences Corp.

Continued from page SI/7

15-month implementation of a new mainframe-based on-line order and distribution system was complete, but "a year late and over budget," says Lester Thierwechter, manager of systems programming.

What went wrong? Among other things, missed project deadlines and cost overruns. CSC's failure to heed the advice of internal IS staffers was another sore point. Thierwechter says that CSC insisted the packaged software application would meet Baker & Taylor's design requirements, for example, even though an internal study by the company's IS group had reached the opposite conclusion. "I don't think they understood our expectations as well as they should have," he says.

In another case, CSC took far too long to lay out precisely what is and is not included in a project, according to a vice president at a \$250 billion Midwest manufacturing company. The manufacturing company had recruited CSC to build a new order-management system that would be tightly integrated with a credit system CSC already was building for the company. But the order-management system was never completed.

Instead, the vice president says, what his company received was a comprehensive report on the state of systems already in place. This was issued after what he calls a months-long "map-and-gap" process. This involved CSC "looking at the whole enterprise because the [new] order-management system had what we call 'hoses' to 40 other systems and they would have to build those integration links."

What's more, the vice president complains, the customer "gets the pleasure of paying [CSC] \$1,000 a day" during the study process. "You're bleeding to death, and you don't know when the map-and-gap will end. Finally, you get sick of it and terminate [the contract]," he adds.

For what he insists are "political reasons," CSC is

still working with the company on a software development project that does not include systems integration. (For this reason, the vice president requested that his name and the name of his company be withheld.)

The idea of building a new order management system also got the ax. Instead, the company bought Oracle Corp.'s client/server financial applications, which Oracle modified for the company.

THE COST OF COMPLEXITY

Robert "Skip" Savoia, CSC's vice president of industry practices, acknowledges that "there are a couple of truths" in the above examples.

But he also notes that larger integrators such as CSC are called in to work on some of the most complex projects, which are "more dramatic in scope" than those tackled by smaller firms. "When you look at the characteristics of that kind of engagement, you tend to have a longer period of implementation and a wider audience that you're interacting with, so there is a hell of a lot more opportunity to make someone less than thrilled with you," he says.

As for the need for up-front systems analyses, "you just can't slam-dunk a new system in," Savoia says. "There is an enormous hidden, built-in infrastructure that a company has built hooks into over 20 or 25 years. It's all spaghetti, and if you inadvertently interrupt a process, you could shut down a business."

Another oft-cited problem with large integrators is a lack of sufficient technical expertise in the systems and software they are hired to deploy.

Consultants with Andersen Consulting, for example, spent two years installing a clinical orders communications system at the University of Colorado's University Hospital in Denver. But for some of that time, the consultants were learning about the software on which they already were supposed to be experts.

"We thought we were hiring expertise, but we were paying them over \$100 an hour to become trained along with the hospital staff," says Mike O'Connor, a telemedicine project manager with the University of Colorado Hospital Authority.

Keith Burgess, who is

Andersen's managing partner of business integration, agrees that people need to be skilled for the tasks at hand. "But that doesn't mean that each project member from Andersen will be a veteran with 20 or more years of expertise in a particular subject area," he says. What each member will have is access to the appropriate expertise when it is needed.

LONG EVALUATIONS

Another frustration is the time and energy integrators spend in the evaluation phase of a project. Clarence Johnson, director of information technology at World Airways, Inc., a specialty airline based in Herndon, Va., experienced frustration with Electronic Data Systems back in 1991 and 1992.

"They would frequently want to go through a big study and come up with a proposal that might be inches thick, when we were talking about something that would not be all that large," he recalls. "Since then, we've used smaller integration organizations."

As is the case with many of its jobs, EDS got the World Airways work by expanding its presence beyond a project in progress at one of the airline's sister companies — a common EDS practice some users complain about.

EDS offers no apologies.

"I will not make any secret of the fact that, over time, our relationship with a customer can grow," says Barry Sullivan, an EDS corporate vice president. "While we are [at a customer site], we'll take opportunities to sell. I'm not ashamed of that. It's our business."

In the final analysis, a user's willingness to rehire a large integrator does not appear to be tied to any one indicator of customer satisfaction or dissatisfaction. Instead, most seem to take a wait-and-see hiring approach that, for better or worse, continues to make the already big integrators even bigger. •

CASE STUDY: EDS

CLIENT: World Airways, Inc., Herndon, Va.
THE PROJECT: Migrate several mainframe-based administrative systems, including accounting, sales and marketing and ticketing applications, to a client/server environment.

QUOTE: "The idea was for EDS to get the company started [on the new applications] and then they'd be handled by internal IS. EDS did train, but the training they provided was pretty skimpy."

— Clarence Johnson, director of information technology, World Airways

CASE STUDY: ANDERSEN

CLIENT: University of Colorado Hospital Authority, Denver

THE PROJECT: A \$6 million project to implement an on-line clinical orders system.
QUOTE: "Some of [Andersen's] staff consultants had no experience with the products we were installing. We hired them to educate the hospital staff, not educate themselves. The advice I'd give other hospitals would be to rely as little as possible on outside consulting and to cultivate skills and provide education and training for your own staff to successfully manage projects."

— Mike O'Connor, telemedicine project manager, University of Colorado Hospital Authority

HOW THE BIG GUYS RANK

HARDWARE VENDORS RATE HIGHER IN CUSTOMER SATISFACTION

LARGEST 5 HARDWARE VENDORS

	Total North American integration revenue	Total integration revenue	Relative customer satisfaction (rank among 25 firms)
1. IBM Corp.	\$6B	\$9B	14th
2. AT&T	\$1.05B	\$1.75B	12th
3. Digital Equipment Corp.	\$1B	\$2.24B	7th
4. Hewlett-Packard Co.	\$903M	\$1.81B	3rd
5. Unisys Corp.	\$302M	\$1.26B	2nd

LARGEST 5 NON-HARDWARE VENDORS

	Total North American integration revenue	Total integration revenue	Relative customer satisfaction (rank among 25 firms)
1. Electronic Data Systems	\$7.37B	\$9.96B	22nd
2. Computer Sciences Corp.	\$2.27B	\$2.58B	25th
3. Andersen Consulting	\$1.66B	\$2.40B	24th
4. SMS Corp.	\$435M	\$550M	15th
5. Ernst & Young	\$410M	NA	19th

Source: Computerworld and ParaTechnology, Inc.

Note: Companies ranked by total North American integration revenue. See pages SI/17 to SI/19 for details.

King is a Computerworld Senior Editor, Client/Server Applications Software.

More than just hardware

By Steve Alexander

Technical expertise. That's the reason companies hire hardware vendors for systems integration projects, according to *Computerworld's* systems integrator customer satisfaction survey. Unisys Corp. and Hewlett-Packard Co. ranked high in overall customer satisfaction, Digital Equipment Corp. and AT&T Corp. scored in the top half of the field of 25 integrators, and IBM came in at No. 14. (See chart on previous page.)

HARDWARE VENDORS
GET HIGH MARKS
FOR THEIR
PERFORMANCE,
BUT SUCCESS
DEPENDS ON
THE CUSTOMER.

But a project's success depends on more than technology, according to Malon S. Udpick of Jefferson National Bank in Charlottesville, Va. The senior vice president of data systems says AT&T did exactly what it was asked, and if things didn't turn out right, it's the bank's fault for hiding its embryonic strategic plan from AT&T.

Jefferson National, which operates 100 branch banks in Virginia, hired AT&T Global Information Solutions (renamed NCR Corp. last month) to develop an Oracle database for the management of ad hoc financial reports. The problem was that the bank didn't share with AT&T its long-range plans for

generating financial reports from branch banks hundreds of miles away at the click of a button.

"We didn't tell the systems integrator where we wanted to go, because we didn't want them to bid on all that," Udpick confesses.

While the AT&T project turned out as requested, it didn't fit into the bank's evolving plan, irritating some bank executives.

The bank's concealment of its plans violated one of the key rules for making sure a systems integration project comes out right, says David Toub, Digital's worldwide strategic planning director for systems integration. That is: Make sure you have open com-

munications with your systems integrator, because you're likely to get what you ask for.

A customer needs to define carefully a project's goals and objectives to the integrator or risk winding up with hardware that doesn't do the job. And, the customer needs to follow up on the integrator's promises or the project may spin out of control.

That's what happened at Quaker State Corp. when IBM was hired to install an AS/400 and integrate it with laboratory information management system software for Quaker State's Innovation Center, an oil-testing lab in Oil City, Pa. But Steve McNaughton, the center's systems operator and network administrator, says IBM couldn't find any appropriate software, so it recommended development tools instead. Trouble was, none of the tools worked satisfactorily, and Quaker State finally gave up on the 3-year-old project last spring and turned to a network of PCs.

IBM was paid for the project, but McNaughton learned Quaker State shouldn't have let the project continue for so long without results. He should have looked for an alternative solution sooner.

Hardware was not the issue for Kaiser Permanente, the Oakland, Calif.-based hospital and medical clinic operator, when it tapped Unisys for a 14-state electronic-mail system. "We relied on none of their hardware, but rather on their skills in configuring other parties' hardware," says Gary Wilkerson, a Kaiser senior planning analyst based in Atlanta.

Execution was smooth because the scope of the E-mail project already was defined when Unisys arrived on the scene.

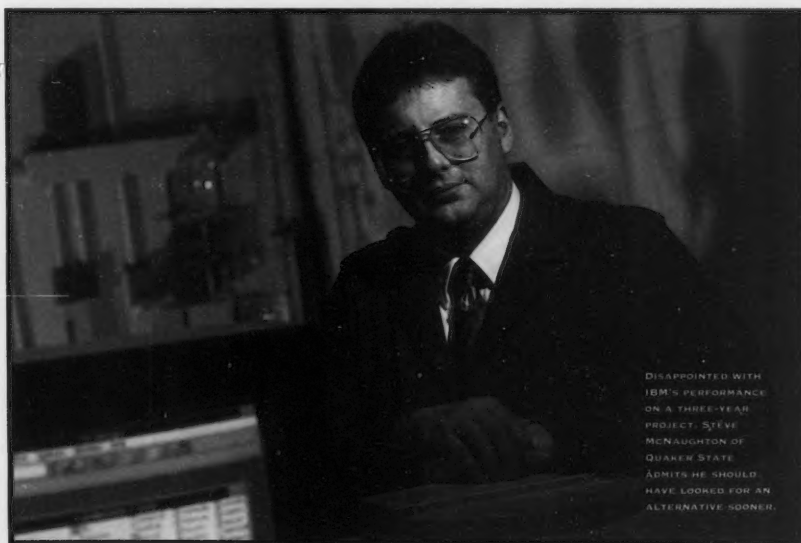
Often, however, defining a project's scope is not enough. The California Department of Fish & Game had to spend time educating its integrator, Hewlett-Packard, on how to handle a geographic information system (GIS) database project.

The idea was to update information on the distribution and condition of fish and other wildlife throughout California in a GIS that would be used to respond to oil spills. Since the department already was standardized on HP equipment, the integration project fell to HP, too.

"Most [hardware] vendors don't have much experience with GIS applications," says John Ellison, GIS manager, California Department of Fish & Game.

Ellison identified the key HP contact person and has worked with that individual for most of the project. "So far, we've had no surprises," he says.

Hardware is often the reason for signing a contract, but other factors are responsible for success. *



DISAPPOINTED WITH IBM'S PERFORMANCE ON A THREE-YEAR PROJECT, STEVE MCNAUGHTON OF QUAKER STATE ADMITS HE SHOULD HAVE LOOKED FOR AN ALTERNATIVE SOONER.

THE PAPER AND INK USED IN THE ORIGINAL PUBLICATION MAY AFFECT THE QUALITY OF THE MICROFORM EDITION.

Photo by Mark Bolster

Alexander is a freelance writer in Edina, Minn.

Step By Step:


How We Got
From There



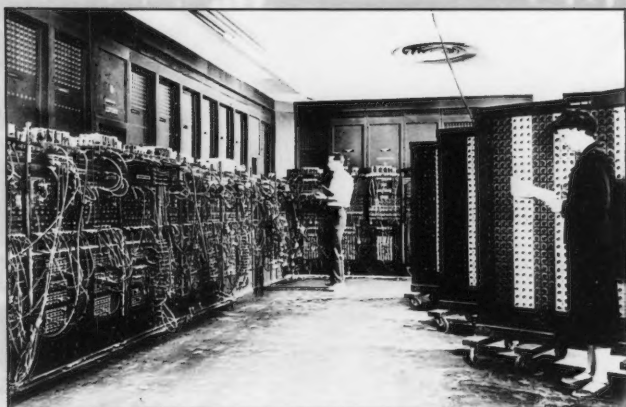
Price Waterhouse,
Business, Industry,
and Technology
Over the Decades



To Here In Little
More Than A
Half Century...

Price Waterhouse LLP 
Management Consulting Services

Business, Industry, Technology Evolve...



Big Boom

1943: U.S. Army funds a \$400,000 electronic computer to calculate paths of artillery shells. The Electrical Numerical Integrator and Computer (ENIAC) occupies a 30' by 50' room, weighs 30 tons, uses 18,000 vacuum tubes — but computes 1,000 times faster than any other device.



Economic Boom

1945: With war's end, U.S. manufacturers fuel a red-hot commercial economy. Price Waterhouse consults on strategy, operations. In a paper universe, card punchers, sorters, printers evolve — to be used well into the 60s. (The punched card, a turn-of-the-century Census Department invention, is the original computing paradigm.)



Sonic Boom

Business and industry soar. Price Waterhouse knows both. Now brings clients managerial advances from World War II and mechanizes accounting. The Systems Department begins to develop useful management tools.



Computers and The Cold War

1950: U.S. government annually spends \$17 million on computer R&D to build atomic bombs and improve guidance systems. Propels American leadership in computer field.

But British mathematician Alan Turing makes the software industry. His concept: a device with a recordable, erasable memory that stores — *in the computer, along with the data* — the instructions the computer is to execute. That coded instruction starts the evolution of "software." Grace Hopper writes a business-oriented language called FLOWMATIC, the foundation for COBOL.

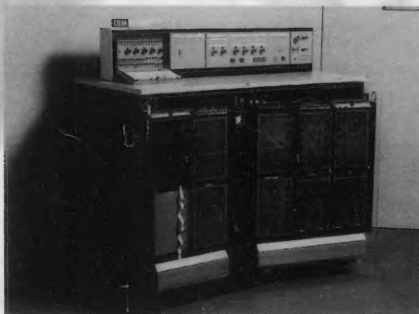
Batches of Opportunity

Resource-rich, the United States becomes manufacturer and distributor to the world. Simple business applications involve lots of handwork and punch cards — commonly called 5081s. Batch processing makes management information available, as computers gain a role in manufacturing, logistics.



Inventing the Future

Learning to apply technology to retrieve vital business information, Price Waterhouse professionals study data processing techniques and tools. Many clients expand and diversify, their needs change and outpace available technology. The world waits for integrated circuits.



Bigger Industry — Smaller Footprint

Transistors replace tubes. IBM introduces the 360. New hardware, storage systems, circuitry, and communications revolutionize the industry. DEC launches first Program Data Processor (PDP), a new class of relatively small, inexpensive minicomputers. Five years later follows the PDP-8, the first mass produced minicomputer.

Mid 60s: COBOL appears. Certain to end the application backlog.

Late 60s: Databases appear. Organizing data will end the application backlog.

The No-Option Option

The manufacturing power on the planet, retooled U.S. plants continue to export. Companies buy computers, but turn to Price Waterhouse and others for implementation. Without computer schools or courses, vendors school their own workers. Offering limited hardware, operating systems, products — vendors dictate the applications companies use. Zero interoperability between systems. Once a company picks a vendor, it's locked in for life.

The T-bill rate hits 3% for the first time — no one expects to see that again.

IBM upgrades the 1401's memory from 4 to 16k — no one expects to use all that power.



Mastering New Technologies

Price Waterhouse hires programmers and systems analysts to design and develop better applications. Clients begin to rely on outside sources for technology needs as productivity requirements outstrip resources. (Sound familiar?)



Personal Computing

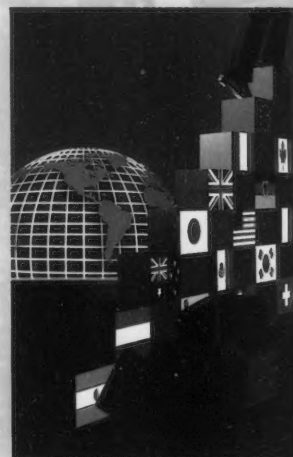
Miniaturizing electronic circuits, chips replace transistors. Computers get much smaller. The inexpensive "personal computer" remains a great concept, but early PC kits prove difficult to build, operate. INTEL founder Gordon Moore thinks silicone components will double in power, halve in price every two years. He's right. VISICALC and Lotus 1-2-3 bring software to the masses, not the targeted business user. Hardware and software garage start-ups join the PC revolution. The Apple 1 with a preassembled computer circuit board appears. DOS and UNIX appear. Real-time data processing comes on-line.

By mid-70s: 4GLs make it far easier to write code. Sure to end the application backlog.

By late 70s: relational databases promise to fix everything. Normalizing data will end the application backlog.

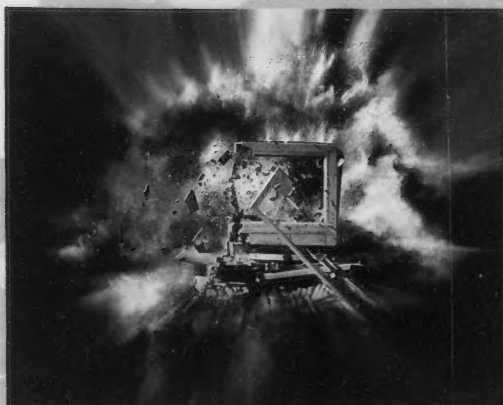
International Markets Lead

Economy softens as overseas manufacturers penetrate the U.S. market with innovative and inexpensive products. The 1973 Oil Embargo caps it with era of stagflation — a stagnant economy and roaring inflation. Information Systems spending — never a serious concern, now a major material expense — hits management's radar screen. Does IS pay its way? More than new systems, companies demand rational systems and better ways to manage the function. To complement existing services, Price Waterhouse adds deep skills in analysis, design, strategic systems planning.



Retake on International

Clients in virtually every industry ask the same questions: *Am I doing the right things? And am I doing those things right?* Answers grow more complex, as international competition begins in earnest. Price Waterhouse's International practice grows. Clients rely on services that span continents and share sophisticated skills to develop competitive strategies.



Technology and Software Explodes

The PC moves into the office and dominates the market with MS-DOS. Apple's Macintosh spotlights graphical user interfaces (GUIs). A whole new genre of human-computer interaction begins with point and select commands and options. Communications flourish with local-area networks (LANs) and wide-area networks (WANs). Faster PCs linked to mainframes and minis create larger, more powerful information networks.

Mainframes and minicomputers handle high-end computing. Comes the client/server revolution and an explosion in software. Independent software vendors offer huge range of applications that run on myriad mixes of platforms, operating systems, languages, databases.

Empowered Management

Economy shifts from manufacturing to services, from international to global. U.S. companies begin to consolidate — mirrored in computer industry shakedowns. Every player is new; mature vendors reinvent themselves or fail. High tech offers new ways to restructure business — and use information as a competitive tool. Executives gain control with desktop information systems.

CASE tools. Absolutely will end the application backlog by mid-decade.

Client/server architecture. Finally. Must end the application backlog.

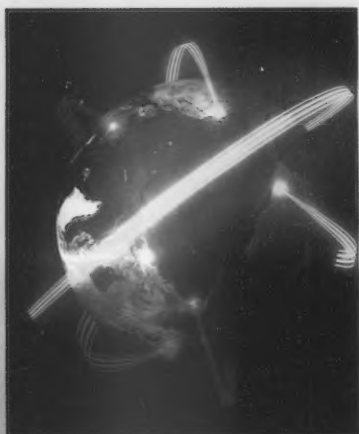


Dynamic Markets

Price Waterhouse launches systems integration practice. Changes staffing profiles, training programs, methodologies — to lead in client/server. Adds vendor alliance program that sweeps market — why custom build when an off-the-shelf package may cover 80% of client needs? Adds industry specialists with in-demand business, process, technology skills. Price Waterhouse's leveraged software products for targeted vertical industries raise the bar.

Step by Step with Price Waterhouse

1990s



The Internet: Wave of the Future or CB Radio of the 90s?

A relatively obscure research and communications tool for academics and governments in the 60s — the Internet grows into a social and economic phenomenon. Zealots see on-line shopping as a major avenue of commerce. World Wide Web (WWW) service lets users send documents with text, graphics and sound. Some think it will replace client/server as the dominant computing paradigm; others that it's a future footnote.

Merging and Downsizing

Global competition. A whole new game where time-to-market is key. Clients rework the supply chain — their vendors, tools, and materials — to bring best quality and value to market, on demand. Once-international companies now operate as global concerns — ready to source materials and operations in Peoria or Punjab. Tighter margins prompt widespread reengineering, mergers, and downsizing.

*Object-oriented technology —
an end to the application backlog?*



Photo by Tom Lippert

Enlightened Leadership

Price Waterhouse sharpens global delivery capabilities in Change Integration® and Information Technology. The market approves:

- Emerson Research Company rates Price Waterhouse in its 1995 "Big 6 Multinational Companies Client Satisfaction Study."
- *Information Week* recognizes Price Waterhouse as "a leader in Information Technology usage."
- *Computerworld* includes Price Waterhouse as the only professional services firm in "The 100 Best Places to Work."
- *PC Week* gives Price Waterhouse its Best Practices Award for KnowledgeView™, a proprietary global data repository of more than 4,000 entries from sources around the world.

The Year 2000 and Beyond

An Information Society



From Internet to Global Village?

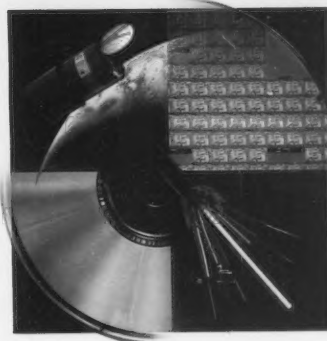
World-wide sharing of information. The Virtual Company eliminates offices and demands an overhaul of systems concepts. A revamp of the notion of stand-alone systems and independent computer environments. No one sits at an isolated desk — or even within a single company or organization. Workers must rethink how they connect, fit into the new world of altered business practices and communications

Rise of Electronic Commerce (EC)

Electronic Commerce will change how business manages existing functions. Electronic Data Interchange (EDI) will automate entire business processes — request for bid, shipping notice, payment will be conveyed electronically. Less paper, less cost. New forms of electronic commerce will go far beyond traditional EDI — such as those that reach out to the consumer via services on the Internet.

Wireless Computing

In the new world of technology, computers are in everyone's hands — and information can be accessed from any physical location. New portable computing devices and communication services are expanding wireless computing environments daily.



Back to the Future

Is the future predictable? It is at Price Waterhouse. In the business of looking forward, Price Waterhouse remains committed to our clients' future. Our professionals forge partnerships with clients to explore options and solve complex business problems. A simple, more than century-old tradition that continues to bring our clients and our firm success.

For more information about Price Waterhouse, visit our Internet World-Wide Web site: <http://www.pw.com> or call 1-800-792-7856.

Avoiding the D word

By Candee Wilde

A systems integration contract gone wrong has all the elements of a nasty divorce. Both sides inflict and endure pain; they lose sleep, money and time. It often takes time to pick up the pieces and start again.

Contracts between integrators and clients are complex, and relationships sour for the same reasons that married couples split up. Unrealistic expectations, lack of communication and a stubborn refusal to compromise can set off a domino effect that brings projects crashing down.

Take, for example, Electronic Data Systems Corp. In a highly publicized dispute late last year, EDS was accused of fraud and civil theft by Florida's attorney general, who is seeking to bar EDS from working in the Sunshine State. In a separate but related proceeding, an arbitrator has ruled that EDS is entitled to some \$50 million in payment from the state for work on a state project.

Or take Andersen Consulting. It's embroiled in several lawsuits with former clients that have alleged fraud, incompetence and neglect. In some of these cases, Andersen is suing for nonpayment.

In *Andersen vs. O'Neal Steel, Inc.*, O'Neal is seeking an award of \$38 million, plus punitive damages, from Andersen in a suit filed in Birmingham, Ala., in September 1994. The suit claims the Chicago-based consultancy misled the Alabama steelmaker about the cost, duration and best method for redesigning its computer system to support re-engineered business operations.

One day before O'Neal filed suit in Birmingham, in what O'Neal attorney Anne B. Stone describes as "a race to the courthouse," Andersen filed suit in Atlanta, seeking fees and expenses it says are due under the contract.

"The project got behind schedule, and the number of hours O'Neal was estimated to have to devote was grossly underestimated," says Stone, a partner with Walston Stabler Wells Anderson & Bains in Birmingham. When the computer system was installed



in O'Neal's Atlanta office, Stone alleges, "it did not work. It caused a complete business interruption."

O'Neal and Andersen tried unsuccessfully to address their differences. Bob Prince, Andersen's managing partner for partnership matters, says the contract called for Andersen to install the new system in all 23 of O'Neal's district offices. But because O'Neal stopped the project before it was completed, Prince says the real issue in the case is, "What would have happened to our contractual commitment if we had been allowed to continue?"

One of O'Neal's business objectives was to completely re-engineer its distribution system. However, "it was clear that a large number of people did not want to go through the changes that were required to make things work," Prince says.

When O'Neal made allegations that Andersen was in default on the contract, Prince says, it was clear to Andersen that the client relationship was broken and there was no longer mutual trust. "In that situation, we had to make a decision about how to best protect Andersen Consulting's interests," Prince says, which led to filing the suit to collect its fees.

TAKING PRECAUTIONS

Problems such as O'Neal's can be avoided.

Don't agree to pay for a project based on time and materials; pay only for systems that work. That nugget comes from Don Blumberg, CEO of D.F. Blumberg & Associates, a Fort Washington, Pa.-based consultancy that works with systems inte-

Continued on page SI/12

"The best time to talk about conflict resolution is when both sides are interested in initiating the relationship."

Harry Glasspiegel, a partner in the Washington, D.C., law firm of Shaw, Pittman, Potts & Trowbridge

Avoiding

Continued from page SI/11

grators and other businesses to help develop business plans and improve productivity.

"Andersen rarely makes a fixed-price implementation," Blumberg notes. "They charge for time spent, not the results they produce. The effect is, they never get done." The practice is common, particularly if the scope of a project is not well-defined. EDS and others, such as Vanstar Corp. of Pleasanton, Calif., work on an hourly basis, too, he says.

Blumberg says clients must protect themselves against spending huge sums and having nothing to show for it. To do that, they must define exactly what they want, give a clear scope of the work and decide what the deliverables will be — then settle on the price they are willing to pay for the job.

BROKEN PROMISES

Andersen's Prince says some disgruntled clients ask for huge financial settlements when they sue, hoping to scare the integrator into an out-of-court settlement. A lawsuit filed by Universal Oil Products (UOP), a Des Plaines, Ill., engineering company that provides technology and products to build oil refineries, is a case in point, Prince says.

UOP has charged Andersen, which it hired in 1992 to streamline UOP's engineering specifications and cost-estimating processes and to develop client/server software applications, with breaking promises, incompetent and grossly negligent performance and "provision of defective and useless systems."

The contract was terminated in 1993, says Eugene Schmelzer, director of UOP's support center, "when we became convinced that Andersen was not going to be able to effectively complete it."

"[UOP] filed a lawsuit against us for \$100 million, which is an absolutely preposterous amount," Prince says. "Our fees on the engagement were \$8 million."

The suit, filed in May 1995, alleges Andersen "represented that it would 'assume responsibility for the price, schedule and quality of deliverables,'" and should "be held to those promises."

UOP has hired another integrator to continue the project and is "very happy with the relationship," Schmelzer says. UOP is working with the new integrator more effectively because "we have been able to set up a close relationship at the working level, not just at the management level."

In contrast, Schmelzer says, Andersen kept UOP personnel "at arm's length" during the project. UOP's suit alleges that in November 1992, Andersen estimated it would take 55,000 hours to finish developing UOP's cost-estimating system. By the next September, that estimate was 88,700 hours, the suit says.

UOP and Andersen might have avoided litigation if the precise goals of the project and the amount of time and money UOP was willing to invest had been agreed upon specifically up front. Consistent and frequent communication would have kept the air clear and tempers in check.

THE STATE OF FLORIDA VS. EDS

Bitter barely begins to describe the public dogfight that erupted several years ago — and is still going on — between EDS and the state of Florida. The sides have sued each other over an \$88 million, three-year project initiated in 1989 to integrate Florida's various welfare payment systems.

In a suit filed in October 1995, Florida's

Tips on avoiding a lawsuit

1. **Pick the right solution and the right integrator.** You must have the right fit to begin with, because a contract will not protect you.
2. **Control the contract drafting process.** Take the lead in developing a contract that covers all aspects of your project.
3. **Be clear on all aspects of the job.** Specify performance obligations, deliverables, acceptance criteria and the like.
4. **Be specific on respective responsibilities.** For example, determine who is responsible for managing third-party software.
5. **Select key project managers on both sides.** Establish a format for project-management reviews and dispute resolution procedures.
6. **Know who you are hiring.** Get as much information as possible about key individuals the integrator plans to assign to your project team.
7. **Keep turnover low.** Contracts for long-term projects should include provisions to minimize turnover of key staff members.
8. **Be very clear about pricing.** Tie payments to deliverables and the achievement of specified milestones.
9. **Negotiate reasonable warranties.** Determine who is responsible for software maintenance and support.

Source: Harry Glasspiegel, a partner in the Washington, D.C., law firm of Shaw, Pittman, Potts & Trowbridge

attorney general charged EDS with fraud and civil theft, alleging that EDS built a computer system for the state's Department of Health and Rehabilitative Services (HRS) that it knew had inadequate capacity, delayed telling the department about the shortfall and then misrepresented the reasons for the problem.

The suit also alleges an EDS employee testified falsely before the state legislature to collect payment for the system. "Under Florida law, this spells F-R-A-U-D," says Steve Parton,

a lawyer in the attorney general's office.

But EDS calls these latest charges "frivolous" and says the state brought them only after a special master hearing, or arbitration, of EDS' nonpayment suit recommended that HRS pay EDS about \$50 million.

The latest suit would not have been filed, Parton says, "if EDS had gone to HRS and said, 'The capacity problems are because we screwed up.' But it's not good for a big systems integrator like EDS to say, 'We didn't do our job. Even though we studied the design, we really didn't know how it functioned.'"

But an EDS spokesman says the courts have had some questions about "the expertise of some of the people at HRS to administer this type of contract."

The lesson, once again, is that a sense of partnership and shared goals is essential. Underlying the comments from both parties is the realization that better communication might have mitigated problems enough to have avoided legal action.

Fortunately, such complex legal snarls are rare and both sides have significant incentive to avoid them, says Harry Glasspiegel, a partner in the Washington, D.C., law firm of Shaw, Pittman, Potts & Trowbridge, which represents both integrators and clients in outsourcing systems integration contracting.

These transactions are among the most complex legal agreements companies can enter, short of a merger or acquisition. Too many times, Glasspiegel says, discussions of potential obstacles are glossed over.

"The best time to talk about conflict resolution is when both sides are interested in initiating the relationship and have incentive to establish fair and reasonable approaches to dealing with issues that might arise in the future," he says. "The success of these transactions is almost always in the details." ♦

Wilke is a freelance writer in Easton, Conn.

WHEN TEMPER FLARE

THINGS OFTEN FALL APART BECAUSE NEITHER SIDE WANTS TO TALK. NOT SO AT AMS.

When Larry McNabb inherited a systems integration project that Bank of America's cash management department was working on with American Management Systems, Inc., things were not going well. The computer system wasn't delivering the promised results, and tempers were rising between personnel from AMS and the bank.

After the Bank of America group executive vice president saw what he was dealing with, he sat down with AMS vice chairman Patrick W. Gross in the bank's San Francisco office. McNabb told Gross he saw three options for the problem-plagued project: It could sink into a finger-pointing fracas, it could be terminated, or both sides could admit that mistakes had been made, forget about placing blame and try to work together as partners to straighten things out.

"I told him I'd rather be partners," McNabb says, "and he says he would too. That was in 1987, and we've been partners ever since."

The lesson? Systems integrators who treat clients as partners and lay their cards on the table early and often are likely to head off "situations" before they become problems, says Paul A. Brands, AMS' vice chairman and CEO. "I don't think there's any magic associated with it."

AMS was voted tops by clients in problem resolution in *Computerworld's* systems integration customer satisfaction survey. (See page SI/18.)

A practical step AMS takes to keep projects running smoothly is scheduling frequent meetings between senior AMS executives and the AMS project team assigned to a client. The client often participates in these meetings, which allow AMS to "identify major risks, potential problems and concerns either side might have. Often, we resolve problems before they

come up," Brands says.

The moral of this story: An ounce of prevention is worth a ton of cure.

—Candee Wilde

Who is the best at problem resolution?

1. American Management Systems, Inc.
2. AmeriData Technologies, Inc.
3. Control Data Systems, Inc.
4. KPMG Peat Marwick
5. Price Waterhouse

Note: Systems integrators are ranked according to customer satisfaction survey results.

Source: *Computerworld* and *ParaTechnology*, Inc.

a wild ride

BEWARE WHO YOU
CONTRACT WITH
WHEN YOU GO
SHOPPING FOR AN
R/3 INTEGRATOR.

Rosemary Cafasso

Joyce Young, director of information technology and services at Tellabs, Inc., a telecommunications products manufacturer in Chicago, put her signature on a SAP AG software contract at 4 p.m. Thursday, September 28.

When she got to her desk at 9 a.m. Friday morning, she had 15 voice-mail messages from systems integrators looking to help Tellabs install R/3, SAP's wildly popular client/server system.

SAP-CERTIFIED INTEGRATORS

Andersen Consulting
Cap Gemini America, Inc.
Coopers & Lybrand
Computer Sciences Corp.
Ernst & Young
IBM Corp.
Deloitte & Touche
KPMG Peat Marwick
Price Waterhouse

Companies on the list of 25 top integrators that SAP has certified in R/3 applications, including all areas of financial, logistics and human resources.

Source: SAP America, Inc.

Like hundreds of IS executives, Young is caught up in the SAP frenzy—a market in which 5,000 new R/3 consultants hit the streets in 1995 alone. The grand total to date: 4,500 SAP R/3 user sites and more than 15,000 consultants worldwide. SAP AG estimates that an average R/3 contract costs about \$1 million. With consulting fees, the price tag could rise to \$5 million.

The SAP integrator market is expected to generate \$5 billion in revenue in 1996, up from about \$2 billion in 1995, according to the Gartner Group, a research and consulting firm in Stamford, Conn.

Hydro Agri North America, Inc., Tampa, Fla., knows what Day is talking about. He had some initial trouble finding qualified SAP programmers. "Through trial and tribulation, we figured out who knew what they were talking about," he says.

Hefer recalls one programmer who professed to be well versed in Abap, the SAP programming language. But when the IS staff booted up some of his software, they could barely get it to run. The company invested close to \$40,000 for the botched work, Hefer says.

Hydro Agri now works with KPMG Setac, a division of KPMG Peat Marwick that specializes in SAP consulting, and some carefully chosen independent local contractors. Bottom line for Hefer: "You need to find people you can really trust, and you can't be afraid to throw people out."

DEMAND EXCEEDS SUPPLY

The SAP hullabaloo has created a dilemma for many companies. Because of R/3's tremendous popularity, the supply of qualified consultants has yet to match the demand.

"With R/3, there's a degree of risk because the [consulting] companies out there haven't been working on it very long," warns Barry Day, global SAP leveraged services manager at Du Pont Co. in Wilmington, Del., a major SAP account that will be ramping up R/3 use this year.

Andy Hefer, information systems director at

CLEANING UP ITS ACT

SAP is working to improve the overall quality of the services provided by systems integrators. The company has several efforts under way, including an authorized partner program, to help customers find the right integrators. (See "SAP-Certified Integrators," this page.) "We want to get rid of people going around saying they are R/3 experts when they are not," says Manfred Heisen, director of corporate alliance management for SAP.

Tellabs' Young, who eventually signed a deal with Deloitte & Touche's Consulting Group/ICS in

OPTIONS FOR STRUCTURING SAP CONTRACTS

- 1. Value-based contracts.** These contracts tie the consultants' fees to specific objectives. It may be difficult to pinpoint goals in such multifaceted projects, but these deals give the integrators an incentive to work hard.
- 2. Sliding scale fees.** Be willing to include "green" R/3 consultants on the team, but pay precious little for them until they come up to speed.
- 3. Pay as you go.** Agree to a certain rate for the project's first phase, when the need for R/3 expertise will be highest. Then cut the rates as you build your own internal R/3 skills.

Source: Industry analysts and R/3 customers

Chadds Ford, Pa., says meeting the team members ahead of time was important. "ICS flew people in from San Francisco and Seattle," Young says.

SAP veterans also say that companies need to consider new approaches to get the R/3 job done.

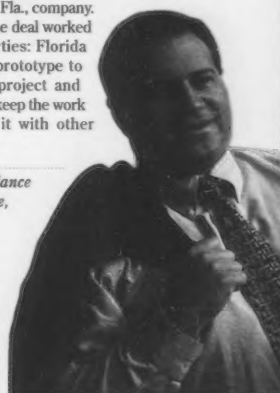
Florida Crystals, Inc., a distributor of sugar products, signed a contract in 1994 with Andersen Consulting in part because Andersen agreed to split the cost of designing an R/3 template, says Rodney Rogers, vice president of operations at the Palm Beach, Fla., company.

Rogers says the deal worked out for both parties: Florida Crystals got a prototype to launch a pilot project and Andersen got to keep the work it did and use it with other clients. ■

Cafasso is a freelance writer in Walpole, Mass.

"You need to find people you can really trust, and you can't be afraid to throw people out."

Andy Hefer, Hydro Agri North America, Inc.



Selling the 'net

EVERYONE IS
LOOKING TO MAKE
MONEY WITH
ELECTRONIC
COMMERCE.
INTEGRATORS MAY
BE AMONG THE
FIRST TO
CAPITALIZE.



By Linda Wilson

Sensing explosive growth, systems integrators are scrambling to develop Internet-specific business practices. The services range from simply reselling hardware and software to architecture design and business-process consulting.

The types of business that integrators are scoping out range from simple Web-server installations and home-page designs to complex electronic commerce strategies and applications. But, because the Internet, particularly the World Wide Web, is still nascent, most integrators don't have a lot of clients yet.

"There is more hype than anything else," says Bonnie Digrui, a vice president at the Gartner

Group, Inc., a research firm in Stamford, Conn.

Most would-be clients are just beginning to think about the commercial potential of the Internet, and they are beginning slowly.

SOUP TO NUTS

While most integrators are evolving their Internet business, approaches vary widely. Large consulting

firms tend to offer a soup-to-nuts approach, providing everything from consulting on business objectives and strategy to the design and implementation of a specific information systems application.

Other niche players offer a much more narrow scope of services, focusing on integrating technology platforms or creating home pages.

KPMG Peat Marwick in New York is a soup-to-nuts integrator. "We focus on business solutions first and then provide technology solutions," says Robin Palmer, partner and national service line leader for the electronic commerce group.

Consistent with its focus as a management consulting organization, KPMG takes a broad look at a customer's business objectives and then looks at how the Internet can support those objectives. "If all you want is someone to create a home page, we are not the guys," Palmer says.

At the other end of the continuum from KPMG is AmeriData Technologies, Inc. AmeriData launched its Internet service, which focuses on home-page design and server installation, in August 1995.

Lake Superior College in Duluth, Minn., turned to AmeriData for a quick and cheap solution for getting on the Web.

"I wanted a turnkey operation for a Web server. I wanted someone with experience who could show me what the procedure is for setting up a Web page," explains Dan Pioro, campus technical coordinator at Lake Superior College, a 1,000-student school.

AmeriData installed a Compaq Computer Corp. server, Web software from Netscape Communications Corp. and Microsoft Corp.'s Windows NT operating system software. From its office in Minneapolis, AmeriData also set up the software remotely and provided instruction on using the system and developing Web pages. The package cost \$7,000, which included a 25% discount for state of Minnesota customers, to which the college was entitled as part of a blanket contract between the state and AmeriData.

USConnect, Inc. in Stamford, Conn., offers services somewhere between AmeriData and KPMG Peat Marwick. The company, which is a consortium of 26 independent network integrators, focuses on the design and implementation of technical solutions, ranging from servers and firewalls

to specific applications. It steers clear, however, of the larger business-strategy issues. Because each of its member firms is independent, services may vary slightly from region to region, although the consortium is now working to develop a standard methodology.

The big-dollar market for integrators, obviously, is in elaborate and expensive services, such as setting up new Web-based businesses or developing on-line services for existing businesses. And integrators are as eager to provide these services as customers are to purchase them.

For example, Digital Equipment Corp. has been working with a bank, which it declined to identify, to develop an application that will allow consumers to apply for a checking account via the Web. The bank is interested in the Web because it believes it is an ideal way to reach young consumers, an important source of new customers.

Deciding which integrator to choose depends, in large measure, on the scope of the project. If you have elaborate plans or want to delve into business process and strategy issues, choose a large player, such as one of the Big Six, Digital or IBM. If your plans are small in scope, a niche player may suit your needs. *

Wilson is a freelance writer in Glen Ellyn, Ill.

MCI'S ONE-STOP SHOP

MCI Communications Corp. wants to be your one-stop information technology supplier.

That, in a nutshell, explains why the telecommunications giant late last year paid \$1 billion for Toronto-based SHL Systemhouse, Inc.

MCI plans to package SHL's expertise, third-party client/server applications such as Oracle Corp.'s financial systems, and its own voice and data services to furnish users with what it calls enterprise management services.

"We'll bundle network activity, applications licensing, help-desk support and infrastructure to provide users with whatever applications they want on a per-workstation basis," says Greg Jacobsen, SHL's executive vice president of strategy and markets and a member of MCI's executive management team.

On the applications side, MCI's partners so far include Oracle, PeopleSoft, Inc. and Microsoft Corp., according to Jacobsen.

MCI, based in Washington, D.C., will position itself as an "information utility," Jacobsen says. Its outsourcing ser-

vices will go beyond those offered today and include everything from providing users with a data dial tone and building and maintaining companies' Internet home pages to assuming "total responsibility" for a company's business applications and the business processes they support.

Last year, SHL signed a five-year, multimillion dollar outsourcing agreement with Tupperware Corp. in Orlando, Fla. So far, its activities have included developing the company's Internet and on-line services strategy, including the creation of Tupperware's home page on the World Wide Web.

On the network side, Jacobsen also foresees MCI and SHL creating "virtual electronic commerce" networks. These networks would link trading partners, all of whom could complete their individual business processes within a network-based business application.

Still unanswered, however, is the question of just how ready businesses are to turn over such a wide variety of mission-critical functions to an outside firm.

—Julia King

PLANETARY PROJECTS

Going global

By Arielle Emmett

Vaughn Hovey knows what's involved in a global integration project. A few years ago, the manager of IT supplier and alliance management at Eastman Kodak Co. was involved in an integration project to consolidate 17 data centers in the U.S., Canada, Germany, France, Japan, England, Brazil and Mexico down to seven.

Kodak chose IBM for the three-year job in 1990 because of its global reach. IBM's Integrated Systems Solution Corp. (ISSC) based in Somers, N.Y., coordinated its work with IBM units in Europe and Japan. "We were looking for one global supplier who could be flexible in working relationships and provide common processes around change and problem management," Hovey says.

"The data center operations included multiprotocol network connections, a Pan-Asian, Pan-European network and physical backbone management," says Gordon Myers, ISSC's general manager of consulting services and managed operations. "In addition," he notes, "we did logical network management in Europe, RS/6000 server implementations in Latin America and LAN-based electronic-mail management in North America."

"Migration went virtually without a hitch," Hovey recalls.

The cost? Upwards of "hundreds of millions," Myers says. "Kodak was the first large company to engage in a contract of this type."

WHAT IT TAKES

With Latin America in the throes of massive privatization, China building new IT infrastructure and American and European companies scrambling to gain better control of worldwide subsidiaries, integrators say the push for global integration is proceeding rapidly toward a tighter, if not more centralized, vision of IS.

Globally, the systems integration market is growing at an annual rate of 14%, according to Input, a research firm based in Mountain View, Calif. Top integrators report that many global integration proj-

ects are now in the eight-figure range.

"In the past, most manufacturers and business partners worked within a confined area; they focused within a state or country," notes Bill McCracken, general manager of marketing for IBM PC Co. "Now customers need to expand their scope; they need global networks to service their own businesses, and they have to respond," McCracken says.

Some companies, such as Cisco Systems, Inc., already have worldwide private or value-added networks in place but require major upgrades to new databases and functional business applications, especially in client/server.

Cisco Systems' eight-month worldwide rollout of Oracle databases and applications — a complete revamp of its business computing — cost \$10 million and involved more than 1,200 users, 10 primary sites

in the U.S., Canada and Japan, and more than 100 corporate sales offices, says Peter Solvik, chief information officer for the \$3 billion internetworking company headquartered in San Jose, Calif.



The company chose KPMG Peat Marwick as the primary integrator for the project. Oracle Services in Redwood Shores, Calif., a professional services division of Oracle Corp., was selected as a technical subcontractor to provide performance tuning and development standards. The project involved installing and customizing all the Oracle applications — from order entry to manufacturing to financials, about 14 modules in all — and making them accessible from Cisco's San Jose computing

Continued on page SI/16

SUCCESSFUL
GLOBAL INTEGRATION
DEPENDS ON
GOODWILL,
A SENSE OF
MISSION AND AN
APPRECIATION OF
CULTURAL
DIFFERENCES.

Going global

Continued from page SI/15
facility to global users across the company's
worldwide private network.

A team of 100 professionals from KPMG, Oracle Services, Cisco and outside consulting firms coordinated the project, handling project management, applications development, business function analysis and technical support. For both Canada and Japan, the design work was done in San Jose.

A project such as this requires more than a passing interest from the top. "[Cisco's senior] management backed the project with dollars and freed up senior people in the organization to make it happen," says Mark Lee, KPMG's senior manager of strategic services consulting.

"They had a sense of urgency," Lee says. "[It's my impression that] when clients don't have a sense of urgency, and they don't have enough full-time people on the [integration] job, projects tend to fail."

"To my knowledge, there's never been a core system legacy replacement done for an entire corporation in eight months," says Cisco's Solvik. "It's very successful; we're on time, within budget and meeting the core objectives."

BALANCING ACT

In many cases, clients do not understand what is required to handle the corporate politics of a global rollout, many integrators say. At the same time, integrators tread a fine line when they impose a standard that corporate headquarters has approved in a country's branch office that prides itself on its autonomy.

"There is a difference between true multinational companies and global companies," observes Frank Callan, a vice president of global business development with Electronic Data Systems Corp. based in Plano, Texas. "Typically, global companies' reporting lines are different; their products drive their individual geographies. By contrast, multinationals have geographies that are more autonomous and choose which products move into various markets."

"As multinationals struggle to move toward the global mind-set, [local geographies] feel left out of the mainstream," Callan observes. "Integrators can get caught up in political battles, and you start to see a pushback — a reluctance of the local geographies to adopt what headquarters has dictated."

Both large and medium-size clients should be looking for global integrators that understand and can handle these subtleties — and can attack a worldwide challenge with a common set of methodologies and practices, Callan says.

But respecting differences is trickier than it may seem. Countries like Japan don't accept imported business practices. "The way you do invoicing and handle the tax system is unique in Japan," says George Kadifa, group vice president for manufacturing practices, Oracle Services. The dilemma is "how to ensure that

you design business processes that are global in nature, but still take care of local requirements, [such as] different geographic requirements," he says.

"There is the major issue of international coordination," Kadifa says. "You've got to avoid duplication and inefficiencies. But how do you ensure that local requirements are met while you're not creating an independent solution as you go?"

"It requires complex methodology and structure to manage global rollouts," Kadifa says.

The methodology involves the implementation of the integrator's plans at the systems and technical level, the network architecture level, the data repository level, and finally at the people level of operations and training.

DIFFERENT APPROACHES

Global integrators and clients have varying solutions. A company such as Omaha, Neb.-based Inacom Corp., which is a shareholder in the Paris-based joint venture International Computer Group, says that global projects work best when large local integrators manage each location.

"Typically, we're working with the largest systems integrator in each country with the most depth," says Chris Freiwald, president of Inacom's international division.

Cap Gemini Sogeti, a French company with operating units in the U.S. and Europe, has a different idea. "Our approach to staffing an international job is to have our local operating units form a global team," says Mike Meyer, executive vice president of Cap Gemini America, Inc.

"About three years ago, we made a \$40 mil-

lion investment to become more transnational, to adopt a common language, English, for all our documentation and business correspondence, and to adopt common service offerings no matter which country [we] go into," Meyer says.

Large companies want global staffing muscle and centralized control, he argues. "It makes us more sensitive to the marketplace. More and more companies are putting one global project manager in charge; they want to work with a global firm on a worldwide basis — what's implied by that is the strong desire to have us look and feel and act as one company." Gemini accomplishes this by using a common methodology and quality management system across all its operating units.

Perhaps most important to the success of a project is being sensitive to cultural differences. "Americans typically make assumptions about [the way other countries operate], especially if it's an American company abroad," says Brad Callahan, a partner at Ernst & Young in Minneapolis.

Callahan cites a case of a U.S. manufacturer that built a distribution and consignment inventory system in Europe based on a California-flavored model. "The company lost about 12 months of progress [because it] assumed that what was true for California was true for the Europeans."

"That's the kiss of death — not to take time to involve each of the countries affected and to get the full buy-in of the client and its local hubs," he insists. •

Emmett is a freelance writer in Wallingford, Pa.



WHEN KODAK NEEDED AN
INTEGRATOR TO CON-
SOLIDATE DATA CENTERS
AROUND THE WORLD, IT
TURNED TO IBM. "MIGRATION
WENT VIRTUALLY WITHOUT A
HITCH," SAYS KODAK'S
VAUGHN HOVEY.



Top Five Global Integrators

(Ranked by % of total integration
revenue derived outside North America)

1. Unisys Corp.	68%
2. Price Waterhouse	65%
3. Control Data Systems, Inc.	60%
4. Digital Equipment Corp.	55%
5. KPMG Peat Marwick	55%

Source: ParaTechnology, Inc.

LISTENING TO THE CUSTOMER

When making any major purchase — a car, a house or the services of a systems integrator — it's always helpful to talk to people who have been through the same experience. The more information you have, the better decision you will make. That's why *Computerworld* asked more than 1,000 information systems managers for input on how well their integrators delivered the goods.

The goods, in this case, are 22 specific criteria, ranging from technical competence to personal relations. We gathered the criteria into three categories: business practices, (displayed in green), project management (orange) and technical performance (purple). These three categories were then combined to create a single ranking called overall satisfaction (shown in red). Aggregated customer satisfaction ratings are on this page, and details for the categories are on page SI/18.

METHODOLOGY

The 25 companies in this special report were selected from a list of the largest 100 systems integrators. The list of 100 was compiled by ParaTechnology, Inc., a Bellevue, Wash.-based market research and consulting firm that focuses on customer and vendor IT strategies. ParaTechnology was *Computerworld's* partner in this project.

To qualify for the list of 100, integrators had to be based in North America — but not necessarily owned by a North American parent — and derive more than 50% of their total integration revenue from commercial, not government, contracts.

The selection of the 25 companies was based on ParaTechnology's estimate of the service component of the company's North American systems integration revenue for the most

Continued on page SI/18

INDUSTRY BREAKDOWN

MANUFACTURING	20%
BANKING/FINANCE	12%
HEALTH CARE	11%
RETAIL	5%
INSURANCE	5%
TELECOMMUNICATIONS	5%
TRANSPORTATION	3%
PUBLISHING	2%
AUTOMOTIVE	2%
LEGAL	2%
WHOLESALE	2%
REAL ESTATE	1%
OTHER	30%

Satisfaction Rankings of Systems Integrators

OVERALL SATISFACTION	=	BUSINESS PRACTICES	+	PROJECT MANAGEMENT	+	TECHNICAL PERFORMANCE
1 AmeriData Technologies, Inc.		Control Data Systems, Inc.		AmeriData Technologies, Inc.		AmeriData Technologies, Inc.
2 Unisys Corp.		MicroAge, Inc.		Unisys Corp.		Unisys Corp.
3 Hewlett-Packard Co.		Unisys Corp.		Hewlett-Packard Co.		USConnect, Inc.
4 Control Data Systems, Inc.		AmeriData Technologies, Inc.		Control Data Systems, Inc.		Hewlett-Packard Co.
5 USConnect, Inc.		Price Waterhouse		Price Waterhouse		The Future Now, Inc.
6 Price Waterhouse		Hewlett-Packard Co.		USConnect, Inc.		MicroAge, Inc.
7 Digital Equipment Corp.		Digital Equipment Corp.		Deloitte & Touche		Digital Equipment Corp.
8 Deloitte & Touche		Deloitte & Touche		Digital Equipment Corp.		Entex Information Services
9 The Future Now, Inc.		KPMG Peat Marwick		MicroAge, Inc.		IBM Corp.
10 MicroAge, Inc.		Entex Information Services		Entex Information Services		AT&T Corp.
11 Entex Information Services		AMS*		The Future Now, Inc.		Price Waterhouse
12 AT&T Corp.		Cap Gemini America, Inc.		Shared Medical Systems Corp.		Control Data Systems, Inc.
13 Cap Gemini America, Inc.		AT&T Corp.		Cap Gemini America, Inc.		Deloitte & Touche
14 IBM Corp.		The Future Now, Inc.		Coopers & Lybrand		Inacom Corp.
15 Shared Medical Systems Corp.		USConnect, Inc.		AT&T Corp.		Shared Medical Systems Corp.
16 Vanstar Corp.		IBM Corp.		Vanstar Corp.		Cap Gemini America, Inc.
17 Inacom Corp.		Ernst & Young		IBM Corp.		Vanstar Corp.
18 Coopers & Lybrand		Shared Medical Systems Corp.		Electronic Data Systems Corp.		Ernst & Young
19 Ernst & Young		Coopers & Lybrand		Inacom Corp.		Electronic Data Systems Corp.
20 AMS*		Inacom Corp.		Ernst & Young		AMS*
21 KPMG Peat Marwick		Vanstar Corp.		AMS*		KPMG Peat Marwick
22 Electronic Data Systems Corp.		Andersen Consulting		SHL Systemhouse, Inc.		Coopers & Lybrand
23 SHL Systemhouse, Inc.		Computer Sciences Corp.		KPMG Peat Marwick		SHL Systemhouse, Inc.
24 Andersen Consulting		Electronic Data Systems Corp.		Andersen Consulting		Computer Sciences Corp.
25 Computer Sciences Corp.		SHL Systemhouse, Inc.		Computer Sciences Corp.		Andersen Consulting

Source: *Computerworld* and ParaTechnology, Inc.

*American Management Systems, Inc.

SATISFACTION RANKINGS

continued from page SI/17
recent complete fiscal year. Services exclude hardware and software resold by the integrator, as well as canned software developed by the integrator for sale.

In addition to revenue, *Computerworld* required that the 25 integrators have a significant presence in the marketplace. Presence was determined by a telephone survey of more than 15,000 randomly selected information systems managers, including *Computerworld* sub-

COMPANY SIZE BY REVENUE

MORE THAN \$10B	13%
\$1B TO \$10B	26%
\$500M TO \$1B	10%
\$100M TO \$500M	16%
LESS THAN \$100M	25%
NO RESPONSE	10%

scribers. Conducted in July and August 1995, the survey asked IS managers to name the systems integrators they have used in the past three years. The vast majority of the 15,000 names used in this survey came from independent sources not affiliated with systems integrators.

Once the list of 25 integrators was established, ParaTechnology surveyed 1,024 of their customers. High-level technology managers with specific knowledge of the integration projects were interviewed, including chief information offi-

cers, directors of technology and IS managers. At least 35 customer surveys were completed for each integrator. For most, 50 surveys were completed. The 1,024 people surveyed were drawn from the aforementioned list of 15,000 IS managers.

Customers were asked to rate their satisfaction with their systems integrators in 22 critical areas, including project completion (on time and on budget), system compatibility and ease of use, and knowledge transfer. The systems integrators were ranked on the mean of their ratings for each category. (The top 10 integrators for all 22 areas are listed on this page.)

Satisfaction was ranked from 1 to 5, with 5 being "very satisfied" and 1 being "very dissatisfied." Mean scores for all systems integrators in all categories averaged above 3 (neutral), and the majority scored below 4 (satisfied). •

PROJECT MANAGEMENT CRITERIA BREAKOUTS

Training provided by integrator to users	Integrator's ongoing service/support	Integrator's quality assurance
1 Deloitte	HP	Future Now
2 AmeriData	AmeriData	Unisys
3 Price Waterhouse	Control Data	AmeriData
4 Control Data	Vanstar	HP
5 HP	Price Waterhouse	IBM
6 Unisys	Entex	Control Data
7 Future Now	Digital	Digital
8 USConnect	IBM	Price Waterhouse
9 Entex	Unisys	Cap Gemini
10 Shared Medical	MicroAge	Deloitte
Integrator's knowledge of your business	Integrator's systems integration experience	Integrator's level of flexibility
1 Deloitte	USConnect	AmeriData
2 Ernst & Young	Unisys	Control Data
3 Shared Medical	HP	MicroAge
4 Unisys	Cap Gemini	Price Waterhouse
5 AMS	MicroAge	Entex
6 Price Waterhouse	IBM	HP
7 AmeriData	Digital	Future Now
8 KPMG	Shared Medical	Cap Gemini
9 Coopers	Future Now	Digital
10 HP	AmeriData	Deloitte
Integrator's project management skills	Project's final price vs. bid price	Project's final price relative to performance
1 Coopers	AmeriData	USConnect
2 Deloitte	MicroAge	Unisys
3 Price Waterhouse	Unisys	AmeriData
4 Andersen	USConnect	Control Data
5 Ernst & Young	Entex	Future Now
6 IBM	Digital	MicroAge
7 HP	Inacom	Inacom
8 Unisys	Coopers	HP
9 Control Data	HP	Vanstar
10 SHL	Vanstar	Entex

NUMBER OF COMPANY EMPLOYEES AFFECTED BY THE INTEGRATION PROJECT

LESS THAN 25	9%
25 TO 49	7%
50 TO 100	11%
100 TO 249	17%
250 TO 499	10%
500 TO 1,000	14%
1,000 TO 2,499	15%
2,500 TO 4,999	7%
5,000 TO 50,000	10%
MORE THAN 50,000	1%

For more information on the methodology, contact Bob Fink, *Computerworld* research director, or Peter Raulerson, president and CEO, ParaTechnology, Inc. Fink can be reached on the Internet at bob_fink@cw.com or by telephone at (508) 820-8116. Raulerson can be reached via the Internet at 71441.121@compuserve.com or by telephone at (800) 377-2021.

BUSINESS PRACTICES CRITERIA BREAKOUTS

Ease of doing business with integrator	Personal relationship with integrator	Integrator's problem resolution process
1 AmeriData	Unisys	AMS
2 MicroAge	AmeriData	AmeriData
3 Entex	Control Data	Control Data
4 Price Waterhouse	Price Waterhouse	KPMG
5 Control Data	Entex	Price Waterhouse
6 Deloitte	Digital	Deloitte
7 HP	Future Now	IBM
8 Unisys	Shared Medical	HP
9 Digital	MicroAge	Unisys
10 Cap Gemini	AT&T	Future Now
Integrator's communication process	Transfer of knowledge to your organization	Integrator's innovativeness
1 Price Waterhouse	Digital	Unisys
2 Control Data	Unisys	HP
3 AmeriData	USConnect	Control Data
4 Deloitte	Control Data	Deloitte
5 Unisys	HP	Price Waterhouse
6 AMS	AmeriData	USConnect
7 KPMG	Entex	AmeriData
8 HP	Shared Medical	Future Now
9 Coopers	MicroAge	AT&T
10 Cap Gemini	Cap Gemini	Digital

TECHNICAL PERFORMANCE CRITERIA BREAKOUTS

Project's technical features	Project's business benefits	Actual vs. scheduled completion time	Compatibility with other systems	System's ease of use	Overall quality of integrator's project	Integrator's technical expertise
1 HP	HP	AmeriData	USConnect	AmeriData	AmeriData	IBM
2 Unisys	Unisys	Price Waterhouse	AmeriData	USConnect	HP	HP
3 AmeriData	USConnect	Unisys	Entex	Future Now	Unisys	Unisys
4 USConnect	AMS	Coopers	Unisys	HP	Price Waterhouse	Control Data
5 Future Now	AT&T	Inacom	Cap Gemini	Inacom	AT&T	Future Now
6 IBM	Deloitte	USConnect	Future Now	Unisys	Entex	USConnect
7 MicroAge	Future Now	Digital	MicroAge	Entex	Future Now	Digital
8 AT&T	MicroAge	Entex	Vanstar	Digital	Digital	Deloitte
9 Electronic Data	Ernst & Young	HP	IBM	MicroAge	USConnect	AT&T
10 KPMG	KPMG	Future Now	HP	Deloitte	MicroAge	Cap Gemini

Source: Computerworld and ParaTechnology, Inc.

Computerworld's Top 25 Integrators by Revenue

RANKED BY NORTH AMERICAN INTEGRATION SERVICES REVENUE	COMPANY	HEADQUARTERS	TYPE OF INTEGRATOR (TOP-DOWN, BOTTOM-UP OR BOTH) ¹	NORTH AMERICAN COMMERCIAL INTEGRATION			INTERNAL TOTAL			VERTICAL MARKETS SERVED ²			WORLD WIDE WEB SITES
				REVENUE (SERVICES ONLY, UNLESS NOTED)	REVENUE AS % OF TOTAL REV. CHUR (SERVICES ONLY UNLESS NOTED)	INTEGRATION REVENUE	REVENUE AS % OF TOTAL REVENUE	NUMBER OF INTE- GRATION OFFICES WORLDWIDE	MARKETS	MARKETS			
1	Electronic Data Systems Corp.	Plano, Texas	BT	\$7,370,000,000 ³	73% ³	85%	25%	450	NA	C,E,G,I,J,K,L,M,P,R,S,U,V,W,X	http://www.eds.com		
2	IBM Corp.	White Plains, N.Y.	BT	\$6,000,000,000	9%	92%	38%	390	15,000	C,D,E,G,J,K,L,M,N,P,R,T,U,W,X	http://www.ibm.com		
3	Computer Sciences Corp.	El Segundo, Calif.	T	\$2,272,000,000	88%	52%	12%	575	NA	C,J,K,L,M,P,R,T,W,X	http://www.csc.com		
4	Andersen Consulting	Chicago, Ill.	T	\$1,678,000,000 ³	49% ³	90%	46%	152	32,711	C,F,I,K,L,M,P,T,W,X	http://www.ac.com		
5	AT&T Corp.	Dayton, Ohio	BT	\$1,050,000,000	1%	70%	25%	1,100	47,000	C,F,K,M,T,U,X	http://www.att.com		
6	Digital Equipment Corp.	Maynard, Mass.	BT	\$1,000,000,000	7%	80%	55%	800	31,000	C,D,E,G,J,K,L,M,P,R,T,U,W,X	http://www.digital.com		
7	Hewlett-Packard Co.	Mountain View, Calif.	BT	\$903,000,000	4%	85%	50%	600	5,000	C,E,G,J,K,L,M,P,R,T,W,X	http://www.hp.com		
8	Shared Medical Systems Corp.	Malvern, Pa.	T	\$434,700,000	79%	100%	12%	36	4,000	L	NA		
9	Ernst & Young	New York, N.Y.	T	\$410,000,000	26%	100%	40%	600	6,300	A,C,L,E,F,I,J,L,M,P,Q,R,T,U,W,X	http://www.ey.com		
10	American Management Systems, Inc.	Fairfax, Va.	T	\$374,094,000	81%	57%	18%	41	4,195	C,G,I,K,L,M,R,T,W	http://www.amsinc.com		
11	Price Waterhouse	Bethesda, Md.	T	\$357,000,000	9%	80%	65%	150	15,000	C,E,H,J,K,M,N,P,R,T,W,X	http://www.pw.com		
12	Unisys Corp.	Blue Bell, Pa.	BT	\$302,400,000	5%	78%	68%	155	NA	A,C,K,L,M,U	http://www.unisys.com		
13	SHL Systemhouse, Inc. ⁵	Toronto, Ontario	T	\$264,000,000	23%	70%	15%	90	4,500	C,D,E,G,I,K,L,M,N,O,P,R,T,W,X	http://www.shl.com		
14	KPMG Peat Marwick	Montvale, N.J.	T	\$249,300,000	4%	65%	55%	1,100	NA	A,B,C,D,E,G,J,K,L,M,N,P,R,T,U,W,X	http://www.kpmg.com		
15	Deloitte & Touche	Wilton, Conn.	T	\$233,000,000	4%	60%	40%	130	3,100	C,E,K,L,M,P,R,T,X	http://www.dttus.com		
16	Cap Gemini America, Inc.	New York, N.Y.	T	\$197,000,000 ³	100% ³	NA	NA	35	2,500	A,C,E,F,K,P,R,T,W,X	NA		
17	Vanstar Corp.	Pleasanton, Calif.	B	\$193,841,089	15%	90%	0%	95	1,641	Fortune 2000 companies	http://www.vanstar.com		
18	Inacom Corp.	Omaha, Neb.	B	\$179,550,000	10%	94%	0%	1,400 ⁷	850	All	http://www.inacom.com		
19	Entex Information Services	Rye Brook, N.Y.	B	\$162,500,000	13%	85%	0%	300	1,900	C,E,K,L,M,N,R,T,W	http://www.entex.com		
20	Coopers & Lybrand	New York, N.Y.	T	\$145,000,000	8%	99%	49%	100	2,400	B,C,D,G,I,K,L,M,P,R,T,W,X	http://www.colybrand.com		
21	MicroAge, Inc.	Tempe, Ariz.	B	\$132,969,293 ⁴	6%	81%	1%	75	768	Fortune 1000 companies	http://www.mid.com		
22	USConnect, Inc.	Stamford, Conn.	B	\$80,676,000	37%	95%	17%	50	1,350	C,D,G,K,L,M,N,P,T,X	http://www.usconnect.com		
23	Control Data Systems, Inc.	Arden Hills, Minn.	T	\$70,697,860	13%	60%	60%	52	2,100	C,K,P,T	http://www.cdc.com		
24	AmeriData Technologies, Inc.	Minneapolis, Minn.	B	\$69,500,000	7%	80%	0% ⁶	70 ⁶	882 ⁶	C,D,G,K,L,M,N,P,T,U,W,X	http://www.ameridata.com		
25	The Future Now, Inc.	Cincinnati, Ohio	B	\$67,000,000 ⁴	8%	98%	0%	26	629	D,G,K,P	http://www.tfn-in.com		

Twenty-five of the largest systems integrators, based on fiscal 1994 data.
Source: ParaTechnology, Inc.

² Vertical Markets Key A. Aeronautics/aerospace
B. Automotive C. Banking/financial D. Business service
E. Chemicals F. Consumer products G. Education
H. Electronics I. Energy J. Entertainment
K. Government L. Health care M. Insurance N. Legal
O. Logistics P. Manufacturing Q. Media
R. Pharmaceutical S. Publishing
T. Telecommunications U. Transportation V. Travel
W. Utilities X. Wholesale/retail

³ Estimate does not factor out hardware and software components of integration revenue.
⁴ Estimate by company.
⁵ Acquired by MCI Communications Corp. in September 1995.
⁶ Figure does not include AmeriData Technologies' 1995 purchase of \$34 million worth of international product integration and maintenance operations from Control Data Systems, which resulted in 1,000 CDS employees transferring to AmeriData.
⁷ Offices include Inacom franchises.
NA = Not available.

¹ T = Top-down integrators typically focus on consulting and applications; the project is driven from the boardroom.
B = Bottom-up integrators typically focus on implementation; the project is driven by the need for new or upgraded technology.
BT = Integrators with both top-down and bottom-up practices.

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Trade C

Banyan leads way to safe E-mail address listings, 66

The Internet

Vendors push 3-D on 'net

By Mitch Wagner

In two years, will the millions of World Wide Web surfers be swooping and flying through a three-dimensional space like something out of *Johnny Mnemonic* or *The Lawnmower Man*?

Some 56 vendors, including Silicon Graphics, Inc. and Netscape Communications Corp., think so. Last week, they banded together to support a technical standard, called Moving Worlds, for building 3-D pages on the Internet.

Virtual reality

Moving Worlds has been proposed as an extension to the Virtual Reality Modeling Language (VRML).

It was submitted earlier this month to the VRML Architecture Group, a multi-vendor body that sets industry standards for VRML. Other competing submissions include proposals by Micro-



All Web pages may have spiffy 3-D graphics in the future

soft Corp., Apple Computer, Inc., Sun Microsystems, Inc., IBM and the German Dynamic Research Center for Information Technology in Sankt Augustin, Germany.

VRML 1.0 has been out for about a year, and several dozen Web sites have incorporated it. There are also about a

dozen browsers available for viewing VRML, some of which function as plug-ins for Netscape or Microsoft Explorer.

The current VRML is rather slow, clunky and cartoonish — even on a high-powered PC — and objects within a VRML universe can't move.

Nonetheless, it works, and you can pilot your browser through a VRML house or a model of part of San Francisco. You can also examine some items of furniture or a car.

"The focus of the VRML experience today is what we call the 'haunted house' effect, where you move through a huge space and see these objects and stop to examine each one of them. Maybe they do something interesting, but basically they're static," said Mike Kelley, manager of the dynamic

media group at Apple in Cupertino, Calif.

Conversely, the proposals for VRML 2.0, including Moving Worlds, would speed up performance, add multimedia support and allow objects to be programmed to move around, using a language such as Sun's Java. The technology was designed to run well on Pentium-class PCs.

Unlike *Lawnmower Man* and other fictional virtual realities, the technologies now being developed rely on conventional monitors, keyboards and mice, rather than head-mounted displays — or direct mind-to-computer interfaces, for that matter.

VRML, page 66

Reality check

Morgan Stanley & Co. is experimenting with VRML as a way to display the results of risk analyses in three dimensions.

Morgan's Market Risks Department uses Discovery software by Visible Decisions, Inc. to model risks of financial investments in varying market conditions. Discovery displays results using a proprietary client. But Harry Mendell, a department vice president, is experimenting with displaying the results in VRML format over an intranet connection to a Sun Microsystems, Inc. SPARCstation running a Sun VRML browser.

By seeing data in three dimensions, it is easier to make intuitive connections than with a 2-D chart or table of numbers. "It allows side-by-side comparison with lots of data," Mendell said. "We've been looking at this data for over a year now, and when we got this running, I saw things I've never seen before."

The advantage of using VRML, if it works, is that Display requires a Silicon Graphics client to run, while VRML can run on any Internet-connected machine.

So far, Mendell said, the results have been disappointing because the VRML client being used is too slow to render images. However, he said he is confident that future browsers, due later this year from Sun, will have better performance. — Mitch Wagner

Intranet product race is on

Firms get set to release tools and utilities to develop internal networks

By Kim S. Nash

These days intranets are a lot like presidential candidates: You hear a lot about them, but you aren't quite sure what they can do for you.

Intranets are internal programs that run over protected parts of the public Internet. They aren't flashy, but a well-crafted intranet can save you money, according to Brian Boyd, director of Internet services at United Video Satellite Group, Inc., a cable and satellite company in Tulsa, Okla.

Some savings, for example, can come from shorter development cycles. In traditional LAN applications, programmers must write parts of the program for different clients — Windows, Macintosh, the Open Software Foundation's Motif and so on. But anyone with a browser, regardless of desktop platform, can use an intranet application.

United Video plans to start moving several internal production applications, including database-related programs, to its intranet between now and May, Boyd said.

Boyd said he can't speci-

fy exactly how much money he will save compared with using a LAN setup, but he said intranet systems "clearly hold a lot of potential for cost and time savings."

Unlike some politicians, the intranet idea has a lot of vendors behind it, with products designed to make it work. In fact, a bunch of tools and utilities were announced recently. Here's a roundup of some of the more notable ones:

• **Microstrategy, Inc.**, a data warehouse tools vendor in Vienna, Va., started beta-testing Web DSS early this month. The product, which is due to ship March 30, was designed to let users analyze marketing information stored in relational databases via various World Wide Web browsers.

Intranet news

Zona Research in Redwood City, Calif., offers on-line delivery of news and commentary related to intranet products. For pricing and other details, send E-mail to info@xbg.com.

• **Grocery firm Hannaford Brothers Co.** in Scarborough, Maine, plans to build a Web-accessible warehouse with Web DSS and hand "all decision-makers" access to the system, according to a spokesman.

The Microstrategy product supports brows-

ers from Microsoft Corp., Netscape Communications Corp., Oracle Corp. and Spyglass, Inc. Concurrent user pricing starts at \$50,000.

• **Open Text Corp.** last week unveiled Livelink Intranet, a suite of search, document management and collaboration applications priced at \$12,500 to \$130,000, depending on hardware used.

• This week, **FTP Software, Inc.** in North Andover, Mass., plans to start shipping a secure, Windows NT-based Web server, dubbed Esplanade, targeted at intranet users. The \$1,195 product comes with a module to link Web applications with legacy information stored in relational databases that support the Open Database Connectivity (ODBC) protocol.

A nonsecure edition of Esplanade is \$495.

A Web-enabled groupware application using Esplanade will likely replace Notes for a team of 25 engineers at Quad Tech International, a large printing company in Sussex, Wis.

"It's just a whole lot faster to communicate with people over the Internet than it is with Notes," said Tom Bosser, a software engineer at Quad Tech.

Banyan takes Internet product plunge

Readies Switchboard white page directory that will ensure user privacy

By Tim Ouellette

Some Internet white page listings are trying to be more than just large electronic-mail directories, while providing users with more privacy.

Banyan Systems, Inc.'s Switchboard, currently in beta testing, will include publicly available names and street addresses for up to 93 million people and 17 million businesses. E-mail addresses will be available but only from users who register with the service.

Based on Banyan's StreetTalk directory technology, Switchboard also lets users have as much control as they want over how their information is listed in the directory. A user can list professional contact information while placing a privacy screen over his E-mail address.

And a "knock-knock" feature will notify those who register that someone wants to contact them, sort of like a Caller ID for E-mail. Analysts were impressed with Banyan's focus on the issues facing registered users, as opposed to the more common practice of

trying to make the searches easier for other on-line users.

"Other systems don't focus as much on the listee," said Thomas Pincince, senior analyst at Forrester Research, Inc. in Cambridge, Mass. "I think the fear [users] have is that they will be a sort of Internet stalking victim."

Switchboard will also soon be able to store public key certi-

icates thanks to an agreement with VeriSign, Inc. Public key certificates let users decrypt secure E-mail from certain users. With Switchboard as a repository for these certificates, users can initiate secure conversations with people whose certificates they don't already possess.

Switchboard, now available, is free for basic searching and listing, but Banyan plans to include value-added services for a fee.

Another white pages directory, newly available earlier this month, (<http://www.four11.com>) from Four11 Corp. in Menlo Park, Calif., lists about 51 million E-mail addresses but also gives users the option to change their own listing. Registered users can add fields to their listing and receive better search capabilities.

To protect users' listings, though, only the domain is listed in search results, not the full E-mail address. And to keep marketers from downloading whole pieces of the directory, Four11 tracks how many times a user pulls addresses off the directory.

The list managers will be beeped automatically when thresholds are reached and can then inform the listee and turn off his listing.

In a nutshell

Switchboard offers the following features:

- Users can remove or modify their listings.
- Registered users can shield portions of their listing with a privacy screen.
- A "knock-knock" feature notifies the listee when someone on the Internet wants to get the listee's E-mail address.

— Tim Ouellette

VRML

CONTINUED FROM PAGE 65

All of which is very fun. But what is the mainstream business application? Proponents argue that, even after the novelty wears off, Internet users will find a 3-D

world easier to understand and navigate than the 2-D, hypertext world of the Internet.

The 3-D technology will have applications in engineering, data modeling, finance, advertising, sales and entertainment.

"A walk-through environment that looks like a store is better than flat Web pages," said Percy

Young, manager of store systems and webmaster at Burlington Coat Factory Warehouse Corp. in Burlington, N.J.

"A business user in the commercial area is looking for an edge on the competition. If the new technology can provide that edge, that's the reason to look at it."

3-D on-line

Using innovative high-resolution 3-D virtual-reality technology, AT&T's ImagiNation Network plans in the third quarter to roll out a completely new version of its consumer online service.

The on-line service with the working name "CyberPark" will let users represent themselves as multimedia figures with human or cartoon forms, dress them in clothing and navigate through a mock-up of a little village, with storefronts, gaming tables, chat rooms and other attractions.

The service, based in Burlingame, Calif., will get around the

bandwidth limitations of dial-up on-line connections by storing a library of graphics on the client machine. The graphics will be stored on a CD-ROM that the user keeps loaded while logged in to the network. The only signals transmitted over telephone lines will control navigation, text and voice signals, and a tiny amount of new multimedia content for each session.

Initially, the service will go after the on-line gaming and entertainment markets, but within a few months after launch, the ImagiNation Network plans to recruit mainstream businesses to post information in its virtual-

reality format.

"We are not just in the business of just making 3-D environments for weird, niche markets," said Dean DeBiase, company president and CEO. "We want to be mainstream and appeal to people who now read *The Wall Street Journal*."

The change to advanced technology is a big step for ImagiNation, which has fewer than 100,000 consumers—compared with subscriber bases in the millions for America Online, CompuServe and Prodigy. The ImagiNation network now focuses on on-line gaming, from backgammon to sports simulation to space wars. It runs using a proprietary, DOS-based front end.

— Mitch Wagner

Offers low-cost version of BeyondMail

By Tim Ouellette

Banyan Systems, Inc.'s Internet efforts picked up steam last week at Internet Expo with the announcement of Internet electronic-mail software and a privacy-enhanced directory of E-mail addresses.

Banyan's new Internet division — Coordinate.com — previewed BeyondMail Personal Internet Edition and Switchboard, the E-mail directory, at the San Jose, Calif., conference.

BeyondMail Personal Internet Edition is a \$29 consumer offshoot of the \$105

Professional version announced for business users

in December. The products support Internet standards such as Simple Mail Transfer Protocol (SMTP), Multipurpose Internet Mail Extensions and Post Office Protocol-3 (POP-3) and require POP-3 and SMTP mail servers.

Switchboard is like a "white pages" listing of E-mail addresses that is accessible on the World Wide Web. But Switchboard lets users decide to what extent their E-mail addresses will be revealed to visitors at the Web site, (<http://www.switchboard.com>).

(see story at left). For example, users can prepare their own listing and invoke a privacy screen that prevents the E-mail address from being divulged but alerts users when someone

wants to contact them.

Switchboard initially will be promoted as a free consumer service to gain recognition, but analysts see the directory as a place for business communications. "People will start to use it as a business tool, especially because it is blazingly fast," said Thomas Pincince, a senior analyst for network strategy at Forrester Research, Inc. in Cambridge, Mass.

The personal and professional Internet mailers add external E-mail capability to Banyan's internal E-mail installations. The Service Employees International

Union in Washington uses the Message Handling Service ver-

sion of BeyondMail internally, but for Internet mail there were no good gateways, said network manager Steve Loudermilk.

He said that initially he was a little skeptical about Banyan's Internet efforts, but Loudermilk said the Internet E-mail package looks exactly like the tried-and-true LAN versions and adds BeyondMail's strengths in filtering rules and electronic forms.

The rules can be used to automatically download a user's favorite Web sites each day so that they can be read off-line. And like some other E-mail packages, BeyondMail lets users add Web hot links to a message so that the recipient can automatically connect to that site.

Briefs

MIMEsweeper now shipping

Central House Technologies, Inc. is shipping MIMEsweeper, virus software for Internet mail and Lotus Development Corp.'s CC:Mail. It checks electronic mail and Multipurpose Internet Mail Extension (MIME) attachments for viruses. It costs \$2,875 for 100 users.

Safer commerce on the Internet

Netscape Communications Corp. signed a deal late last week to bundle its Commerce and Merchant World Wide Web servers with forthcoming secure transaction software and services from Verifone, Inc. Verifone in Redwood City, Calif., plans to target the offerings at banks, credit card processing companies and other financial firms that

process transactions conducted by on-line retailers. Verifone's products are due out in the second and third quarters. Prices will be determined on a case-by-case basis, depending on the type of consulting services users buy, a Verifone spokesman said.

Firm releases Java development environment

TakeFive Software in Cupertino, Calif., last week announced a version of its Sniff+ software development environment for Sun Microsystems, Inc.'s Java Internet programming language. Sniff+ for Java, which is based on TakeFive's C++ development tool set, will ship this quarter; pricing hasn't been set.



Star Trek

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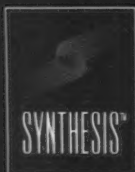
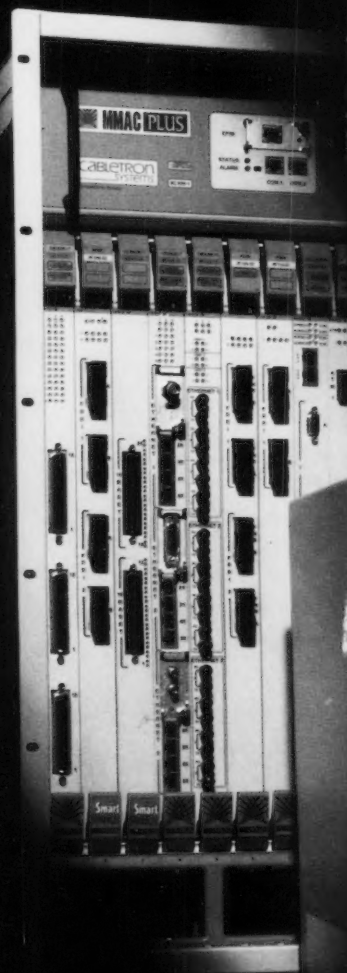
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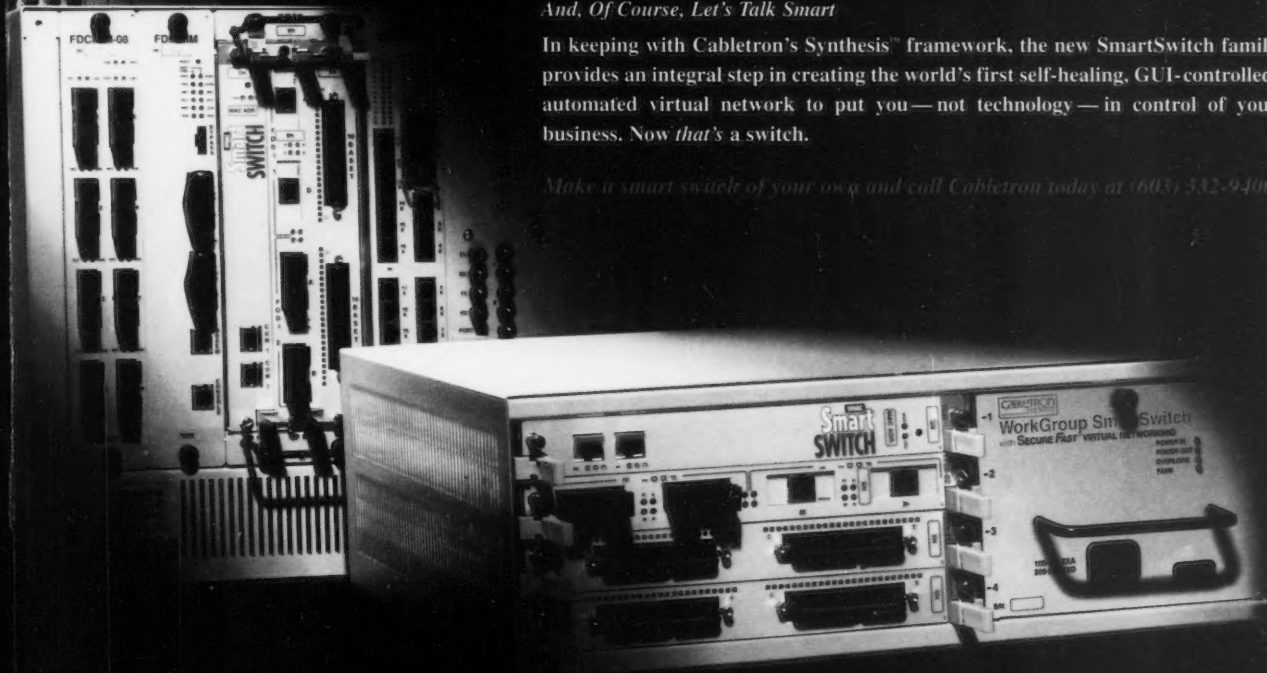
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Whether you're starting from scratch or building off an existing network, SmartSwitches are the perfect fit. The MMAC and MMAC-Plus SmartSwitches protect investments as they leverage the security and reliability of a "smart hub." The modular Workgroup SmartSwitch provides up to 48 switched Ethernet ports as well as a high-speed uplink, and includes many of the same fault tolerant features you'd expect from a Cabletron hub.

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New Products

Digital Equipment Corp. has announced Internet Collaboration Solution Package.

According to the Maynard, Mass., company, Internet Collaboration Solution Package is a customizable hardware, software and services package designed for users interested in workgroup collaboration. It lets

users, partners and suppliers share information, notes, files, discussion groups and other collaborative efforts across internal (intranet) and external (Internet) networks.

Internet Collaboration Solution Package can include Digital's AlphaServer system and Workgroup Web Forum software. It can also have use of Digital's tunneling products and software.

Pricing for Internet Collaboration Solu-

tion Package starts at \$55,100.

► **Digital Equipment**
(508) 334-4825

Visual Components, Inc. has introduced Formula One/Net.

According to the Lenexa, Kan., company, Formula One/Net is an Internet spreadsheet component that gives spreadsheet functionality to World Wide Web site content providers and Web browsers and a

method for providing interactive Web content. Formula One/Net is the basic component that lets users view, update data and text and interact with embedded Formula One workbooks.

By using Netscape Communications Corp.'s Navigator 2.0 and Formula One/Net, a content provider can embed workbooks in browser windows. Embedded workbooks let Web content providers add data with calculated values, formatted tables and efficient localizable forms to their Web sites.

Formula One/Net is free.

► **Visual Components**
(913) 599-6500

AIIPen Software, Inc. has announced NetHopper Server, which is a World Wide Web product for Apple Computer, Inc.'s Newton.

According to the Los Gatos, Calif., company, NetHopper Server lets multiple Newtons simultaneously connect to the World Wide Web via a single Macintosh.

NetHopper Server was designed to let users set up a Macintosh gateway application at a corporate office and dial in to a NetHopper Server gateway to pull down information from their Web site.

NetHopper Server works with personal digital assistants that run the Newton 2.0 operating system. Pricing starts at \$1,499.

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Brooks Internet Software, Inc. has introduced Remote Print Manager.

According to the Idaho Falls, Idaho, company, Remote Print Manager is a server software package that lets users print to a PC across the Internet and enterprise networks. Users send print requests from another computer — including mainframes, Unix and IBM AS/400 workstations or another PC — to their PCs via the standard Internet print protocol, LPR/LPD.

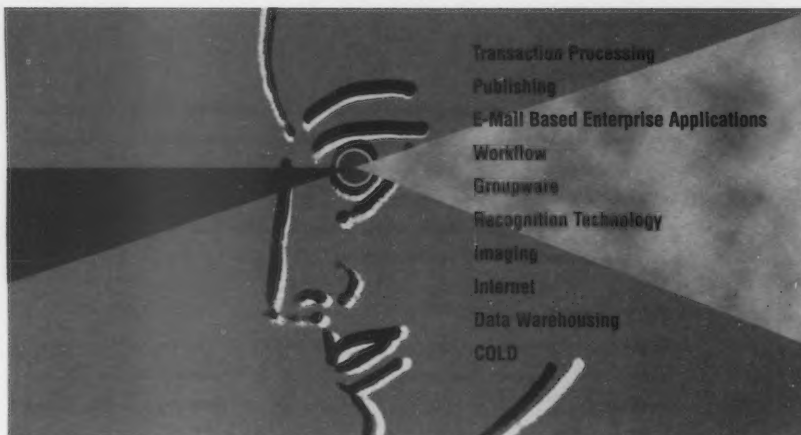
Remote Print Manager supports multiple, independent queues. Each queue can be configured with its own printer, printer setup, fonts and margins.

It can print to local and networked printers by formatting the text or sending it directly to the printer. Remote Print Manager fully supports the LPR protocol for Internet printing and accepts requests from mainframes running MVS, CMS and CICS applications from Unix and AS/400 workstations.

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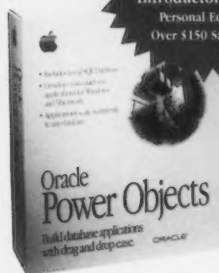
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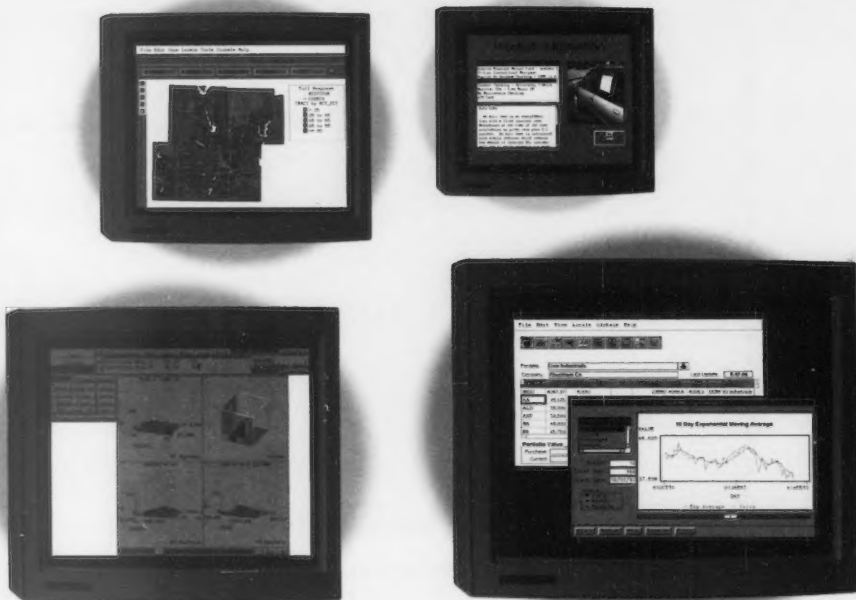
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Software auditing tool helps insurer cut costs, 76

Corporate Strategies



The 'cafe' at MCI's Boston Rally Center is a coffee bar with laptop connections where field representatives can meet to compare notes

Virtual-office prototype puts field service reps to work at 'hearth' of MCI

By Mindy Blodgett
BOSTON

Words such as "hearth" and "cafe" might bring to mind homey images of a country inn, but at the MCI Rally Center, these are parts of a futuristic virtual office.

The Boston Rally Center started operating last month and is the first of 200 such offices that MCI

Communications Corp. plans to roll out in the next year or so. The rally center concept is the second phase of MCI's approximately \$75 million investment in a mobile client/server project.

This is one of the largest sales force automation plans ever undertaken. Eventually, more than 5,600 field service representatives

MCI, page 76

Pier pressure

Inventory management system helps retailer boost sales

By Thomas Hoffman

Most retailers took a beating over the holidays, and even industry kingpin Wal-Mart Stores, Inc. saw its streak of 99 consecutive profitable quarters laid to rest.

But one notable exception was Pier 1 Imports, Inc., the Fort Worth, Texas-based specialty retailer. Its 20% sales gain in the recent Thanksgiving-to-Christmas period over the year before was aided by a mainframe-based inventory management system.

Roughly 85% of Pier 1's home furnishings and other merchandise are imported, mostly from mom-and-pop manufacturers in the Pacific Rim, according to Jim Deats, the firm's vice president of information systems.

Because these small manufacturers aren't too computer-savvy, Pier 1 set up its agents — companies that track these small shops

— with electronic data interchange (EDI) technology through a new inventory management system. With EDI, the agents are better positioned to manage order fulfillment and consolidate and direct the shipment of goods to the retailer.

Four years ago, Pier 1 began installing the inventory management system, which is based on IBM CICS/VSAM and uses home-grown software that runs on an IBM ES/9000

Model 9021 mainframe. Pier 1 modified and fine-tuned the software in 1992 and 1993 to extend it to its trading partners.

By 1994, the company's internal users began learning the nuances of the system. "That helped our user groups to [effectively] manage inventory over 1995, and Christmas validated that," Deats said.

Inventory management systems allow retailers to "reduce the possibility of being out of stock," said Robert Berger, a principal at Berger Advanced Management Services, a Hillsboro, Calif.-based retail consultancy. "The larger companies get, the more difficult it becomes for them to control the flow of merchandise at a distance from their headquarters."

The result: better control over inventory dollars, reduced expenses from the refusal of slow-moving goods and improved customer loyalty from keeping goods well stocked.

Pier 1 was aided by other technical improvements over the holiday shopping season, including an upgrade of the communications network that supports its 693 outlets. In July, the retailer began rolling out new communications software over its TCP/IP Ethernet network to speed credit authorizations from its IBM 4693 point-of-sale systems.

The dial-up systems, from Harmonic Systems, Inc., have cut Pier 1's credit authorization times by 50% — to 3 to 5 seconds.



Pier 1's Jim Deats says the inventory system helps manage import of products from mom-and-pop manufacturers

Research laboratory uses desktop ATM for video

By Bob Wallace

Lawrence Livermore National Laboratory believes ATM stands for Advanced Technology that Matters.

The research organization at the University of California is using desktop-based Asynchronous Transfer Mode (ATM) at 25M bit/sec. to support a critical on-demand distance learning application.

ATM is an emerging switching technology that can handle voice, data and video traffic simultaneously. It also can switch that data at higher speeds and more efficiently than most of today's switching gear.

First targeted at users' backbone networks to handle heavy traffic, ATM more recently has become available on the desktop from First Virtual Corp. (FVC), IBM, Madge Networks, Inc. and Whitetree, Inc. These lower-speed, lower-priced desktop ATM wares, however, still aren't priced where most commercial IS shops will buy them, most observers agreed.

Classes on video

For its part, Lawrence Livermore wanted a desktop ATM system for a video application — to broadcast live technical classes, via video, to its staff. When it began looking for a system

Low-cost leader

IBM is the price leader for now in 25Mbit/sec. ATM products. Its \$495 price includes a port on an ATM switch as well as an ATM adapter card.

about 18 months ago, only FVC, with a turnkey video system, supported its requirements of 25M bit/sec.

"We found that the number of people that watched the classes live when they were broadcast had fallen to roughly 1%," said David Dirx, product manager for advanced video research at

Lawrence Livermore. That forced the lab to record and deliver tapes to the masses — a timely and costly process.

"We looked at Ethernet switching, but there was no way to guarantee the quality of the video transmissions," Dirx said. ATM, however, supports quality of service, through which users can set parameters to guarantee enough bandwidth is available whenever needed. Quality of service also ensures the quality of both voice and video transmissions, which is important because neither can tolerate delay.

FVC's package came with the Media Operating System, which

is optimized for multimedia — not just data — and a super high-capacity storage system that acts as a "video jukebox."

Rather than playing your favorite MTV music video, the jukebox stores video streams for transmission out to desktops when needed, a key capability for Lawrence Livermore.

Pricing wasn't the top concern when the organization decided to go with FVC, but money will be a factor in its deployment of ATM to the desktop. "I can see rolling it out to about 1,000 end users in the next year or so, but that all depends on our budget," Dirx said.

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Corporate Strategies

Software auditing tool helps insurer cut costs

Firm expects to save \$1.7 million by 2000

By Thomas Hoffman

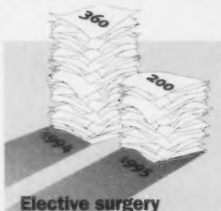
Like other legacy-bound organizations, Blue Cross/Blue Shield of Minnesota was maintaining an inordinate number of mainframe software licenses. By 1993, the number had mushroomed to 360 — a lot more than the insurer was able to track manually with three systems staffers.

"Basically, we were in chaos," said Alan Bain, a senior technical analyst at the St. Paul-based health insurer. "When the bills came in, we didn't know who was using the software, and we often had two or three packages that were doing the same thing."

To get its arms around its software assets, Blue Cross/Blue Shield of Minnesota installed Ison Corp.'s SoftAudit package, an IBM MVS-based product designed to locate, identify and monitor the usage of all other software on a system.

Since installing SoftAudit in late 1994, the company has narrowed its mainframe software license base to fewer than 200 contracts. With this tool, the company expects to trim its software expenses by \$1.7 million through 1999.

The package has already started taking a bite out of expenses. In late 1994, for example, SoftAudit



Elective surgery

Since installing a software auditing tool in late 1994, Blue Cross/Blue Shield of Minnesota has cut its mainframe software license base from 360 contracts to fewer than 200. With this tool, the company expects to trim its software expenses by \$1.7 million through 1999.

it identified a fourth-generation language (4GL) that only five people were using for ad hoc reporting. Once the end users were consulted, the firm decided to transition them to an SAS Institute, Inc. 4GL already in use. That effort, completed in December 1995, saved Blue Cross \$100,000.

Software efficiency

Blue Cross has since consolidated two copies of its Compuware Corp. File-AID data management software, which more than 500 staffers use to browse and edit large VSAM files and IBM IMS databases. In addition, the company used SoftAudit to eliminate one of its two copies of IBM's Distributed Office Support System library management software.

The company also has used SoftAudit to identify its most frequently used mainframe software and negotiate long-term MIPS-based and site licenses. It did so with IBM and Computer Associates International, Inc. last year.

Because Blue Cross licenses IBM software for each CPU, it was able to use SoftAudit to identify where software wasn't being used effectively or at all.

The sum of these efforts has helped the insurer's information systems department meet and exceed a 1995 corporate mandate to reduce software expenses by 10%. Effective software asset management meant the firm underspent its software budget by 25% last year, and it is on target to do the same this year.

MCI

CONTINUED FROM PAGE 73

will work out of rally centers throughout the country.

The Boston center is notable for its mobile workforce deployment, its state-of-the-art technology and advanced office design.

Instead of having to report to an office and a designated cubicle every day, the center's approximately 120 sales representatives can work anywhere, anytime, by using loaded IBM 755CD ThinkPads that connect via client/server software.

Sales representatives can share tips and retrieve data from resources that include a business library that lets users download pamphlets and product features.

The center of the office is the "hearth," a large, wide-open room with muted colors. Modular furniture — including small tables,

comfortable chairs and laptop stands — are scattered around and can be moved to suit individuals' needs. Plugs allow laptops to be connected via floors or walls. Large, rolling whiteboards are provided as planning tools or to close off areas during meetings.

At the corner of the room is the "cafe," a coffee bar with laptop connections where field representatives can meet

to compare notes. A large video monitor is in another corner.

"Home base" is a locker area where sales representatives keep small rolling files. Before moving into the virtual office, representatives were required to throw out anything they didn't really need and fit everything they considered essential into the rolling storage bins.

Representatives can set up shop for the day in the "heads down" area, which was devised for quiet work.

"The managers roam around too; we share three glassed-in of-

fices [among] 18 managers," said Susan Beckmann, the branch director at the Boston Rally Center. "And we're out on the floor more often than not, not holed up in our offices."

"What MCI has done right is to treat this center concept as a technological development issue as much as a business development issue," said Gil Gordon, a telecommuting analyst at Gil Gordon Associates in Monmouth Junction, N.J. "And not so much for what this will do for space-saving costs, although that will happen too."

"The other thing that will likely make this a successful rollout is that this is very aggressive. This isn't a pilot or a toe-in-the-water project; the Boston center is actually a prototype," Gordon said. "It's the first one out of the box."

Beckmann said MCI hopes the center will raise sales and revenue by as much as 30% in the first year of operations.

MCI uses Xcellenet, Inc.'s RemoteWare 2.0 development tools and an Xcellenet server.

General Electric promises 'net business transactions

By Thomas Hoffman
NEW YORK

Customers and analysts are bullish about General Electric Information Services' new GE InterBusiness service, which was designed to enable member firms to conduct business-to-business transactions over the Internet.

GE InterBusiness uses GEIS' "double challenge" approach and allows for the secure transmission of sensitive data over the Internet. The approach includes a dynamic session key that encrypts each Internet session between sender and receiver.

GEIS expects the service to enable its 40,000 value-added network (VAN) customers and other prospective clients to exchange secured electronic data interchange (EDI) and sensitive electronic messages.

"EDI requires a lot of encryption and data management," said Amie Shapiro, an analyst at International Data Corp. in Framingham, Mass. GEIS' double-challenge technique differentiates it from other Internet-based EDI service providers, Shapiro said.

Daniel DiGregorio, director of technical support at Air Express International in Darien, Conn., said his firm plans to use GEIS' product so its customers and field agents can access a mainframe-based freight tracking system.

Providing Internet-based access to this data to customers in places such as Russia and South America traditionally has been a challenge; VAN services aren't exactly abundant in those regions of the world. GE InterBusiness will help Air Express extend its reach in places that don't have a VAN presence, DiGregorio said.

Briefs

Melville outsources

Melville Corp., the Rye, N.Y., parent company of retail chains such as Kay-Bee Toys and Thom McAn Shoe stores, has outsourced its information systems to Lockheed Martin Corp. Under the 10-year, \$244 million deal, Lockheed Martin will manage Melville's core IS functions, including accounting, payroll, in-

ventory and stock ordering, through its recently formed Integrated Business Solutions Co. unit.

SSA suit dismissed

System Software Associates, Inc. (SSA) said a class-action suit filed against it has been dismissed. Attorneys representing the stockholders who filed the

suit dismissed the action voluntarily, the Chicago company said. A second suit, filed by Owens-Illinois, Inc. that charges SSA with fraud and deceptive business practices, remains pending in a Chicago court.

ISSC snags contract

The MetraHealth Cos., a subsidiary of United Healthcare Corp. in Minnetonka, Minn., has signed a 10-year, \$540 million outsourcing contract with IBM's Integrated Systems Solutions


Corp. (ISSC) services unit. Under terms of the contract, ISSC will assume responsibility for MetraHealth's data center operations and support.

Eagle outsources

Eagle Food Centers, Inc. has signed a \$50 million outsourcing deal with SHL Systemhouse, Inc. Under the deal, Eagle will outsource its data center operations, legacy applications and networked systems management.

Ernst & Young finds ally

Ernst & Young has announced an alliance with Tata Consultancy Services in Bombay, India, that will effectively double the Big Six consulting firm's reach in the Asian market. It will give the firm an additional 5,000 consultants and is expected to help it increase its Asian revenue to more than \$500 million by 2000, said David Spilberg, worldwide director of the firm's Information Technology Consulting Services division.



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Help desks. Data centers. Systems development. Much of the IS scene is centralizing once more. Join two researchers — and one top CIO — as they go trend-spotting and see how your group compares.

By Allan E. Alter

The wind is shifting again.
Centralize or decentralize?

“**W**hatever direction we’re going in now, we’ll be going in the opposite direction in five to 10 years,” says David Evans, vice president and director of information systems at J. C. Penney & Co. in Dallas. Nevertheless, *Computerworld* asked two of the field’s top forecasters — John F. Rockart, director of the Center for Information Systems Research at MIT, and Mike Braude, senior vice president and chief research officer at Gartner Group, Inc. in Stamford, Conn. — to tell us which way the wind is blowing.

And just to keep them honest, we invited Evans to do what any good weatherman does just before he goes on the air: open the window for a reality check.

Bottom line? The decentralization front has just about passed.



Help desks

Here’s an area where the trend is to centralize, though our panel doesn’t agree on exactly what centralizing is.

Rockart says companies are moving away from running separate help desks for different systems. With client/server computing, help desks must sniff out whether the network, the server or the software caused the snafu. “We will go to major centralized network and systems management and to centralized help desks. But it will take a while,” Rockart says.

Braude says two opposite trends are going on. Central corporate help desks are handling basic, simple support problems in about 60% of companies. Trickier questions involving network administration and application problems are being handed to decentralized help desks in 80% of companies. So, for instance, a user who complains he can’t log on in the morning will call a central corporate help desk. But if a major purchasing application isn’t working right, he will call the specialists.

Evans agrees that central help desks are the way to go. But he wants tools that allow help-desk pros to take control of a user’s PC over the network, so they can see the problem for themselves on-line.



Data centers

Companies are consolidating data centers, but few large companies have cut back to just one.

This was a no-brainer for our panel — faster response times, mainframe management tools and low telecommunication costs make it possible to run a worldwide network from a single data center. And by consolidating data centers, companies can reduce labor, software licensing and disaster recovery costs.

Braude adds that movement toward decentralized client/server systems has stabilized. Traditional data centers are now being asked to manage departmental/distributed systems in a centralized manner. In part, that’s because companies have yet to find systems and network software that do an adequate job of managing

decentralized systems in a decentralized manner.

But there are caveats: Most firms are still running at least two data centers, for the sake of disaster recovery. Monster data centers aren’t necessarily the cheapest solution, Braude says. “Our data indicates that efficiency [cost per MIPS] in data centers peaks at about 200 MIPS.”



Systems development

Moving systems developers out of central IS into business units doesn’t look like such a great idea anymore.

Yes, systems developers came to better understand the business, and they got closer to the customer. But many companies no longer need many dispersed devel-

“The pendulum is rebounding from totally decentralized computing”



Mike Braude, senior vice president and chief research officer, Gartner Group

From 1985 to 1995, PCs and client/server moved too far away from centralized computing. Companies were rebounding from their past dependence on the IS priesthood.

Today, companies are turning away from totally decentralized client/server or network computing, Braude says. The expense and difficulty of managing decentralized computing is one factor. The immobility of mainframe applications and their data is another.

However, the network computing genie is out of the bottle. The pendulum will never swing all the way back. For the next five years and beyond, enterprises will struggle to find the appropriate balance.

There you were, minding your own business, and they went and made you a manager. Now what? Page 80.



John F. Rockart, director of the Center for Information Systems Research, MIT

'Global competition is the headline'

Global companies must compete and manage supplies and personnel worldwide, yet their local offices need enough decision-making autonomy to respond to local customers and market conditions. That means IS must develop worldwide standards and centralize information technology purchasing, while making sure that locals have the authority to meet local business and technology needs. This is the force driving the move to "federal" IS organizations, which explicitly divide authority for information technology between central IS and local users, Rockart says.

opers, Rockart says. Corporations are standardizing on software packages and centralizing support functions such as finance and purchasing.

Braude says many companies are having their development staff at different locations report back to central IS. Without that, he says, it's tough to get the synergies, adherence to standards and data-sharing capabilities that today's cross-functional systems require. Braude and Rockart agree it costs more to run a dispersed systems development function than a centralized one.

And Evans? He's sticking with decentralized systems development. His company has been decentralizing systems development and giving users more control and responsibility for systems in their areas. "That seems to be working well for us."



Data

Data will continue to reside on mainframes, departmental systems and personal files, but that doesn't mean distributed databases — networks of local or departmental databases that function like one central database — are finally coming to corporate America.

Rockart says there still isn't software that does a good job supporting the distribution of data, though that may change in the next two years. He says he expects companies to create standards that allow locally stored data to be shared across sites.

Meanwhile, Braude says database replication — local copies of a central database kept synchronized by the database management system — is taking off because of the difficulties in making distributed databases work well.

Evans thinks internetworking can provide an alternative. "This morning, I was reviewing with our controller some confidential information on a secure server. Before, that data would have had to be centralized. Now, anyone the finance department wants to see the data can have access to it. I think the tools are coming to allow data to reside at its most natural level."



Standards and spending

Who makes IS spending decisions — central IS, or business units and departments? Who is really setting technology standards? And who ought to be making these decisions?

Rockart and Braude agree that although user involvement is necessary, central IS should make the spending and standards-setting decisions. Otherwise, technology costs skyrocket.

But the two don't agree on who is making these decisions.

According to Braude, spending and standards-setting authority is being decentralized right out of the hands of IS. IS has lost too much credibility, and desktop machines are too powerful, for IS to dominate spending de-

cisions. "Though the information technology budget may still be large, IS really needs the concurrence of end users to fund any significant initiatives," he says.

Meanwhile, a few dominant vendors such as Microsoft Corp. are setting technical standards in the real world. Companies pay only lip service to independent technical standards. Is it smart for IS to give up control over spending? Not if management is "really concerned with keeping costs down," Braude says.

Rockart believes the old trend toward dispersing spending and standards-setting authority is ending, as companies seek to contain costs and gain economies of scale. But that doesn't mean the chief information officer can act like a czar. Spending and standards decisions require buy-in and cooperation between central IS and local information technology groups, "which can only be gained by jointly agreed upon rules."

Evans is clearly with Rockart: Standards-setting is more meaningful than ever. "Without central standards, you get a dog's breakfast."



Servers

No agreement here.

Centrally managing servers is the sensible thing to do, Rockart says. It's cheaper than having local server gurus handling each server. "We are clearly seeing a larger number of 'server farms'



David Evans, vice president and director of IS, J. C. Penney & Co.

'The internetworked world is going to happen'

The Internet is "the data equivalent of a worldwide dial tone," Evans says. It allows companies to network without a central control point.

In an internetworked world, he says, companies can centralize or decentralize IS depending on what best fits their business. They don't need to centralize just to accommodate their mainframes.

in what used to be the glass houses."

But Braude hasn't seen any big move to server farms or central management. Communications costs could put the kibosh on efforts to centralize servers, he says.

Evans agrees with both. Physical security, file backup and recovery capability are best done centrally, rather than left to amateur administrators, he says. But if servers are distributed over a wide-area network, telecommunications costs and speeds don't permit centralization. ■

Alter is *Computerworld's* senior editor, Managing.



Technical knockout

The MBA is the quintessential degree in a wide range of industries. But in the information systems field, many long for a program that teaches general management skills and provides a big-picture view of technical issues. One answer may be the master's in technology administration, a degree offered at a growing number of colleges.

The leaders in the field are MIT, which calls its degree a master's of science in management of technology, and Stanford University, which calls its program IEEM, or industrial engineering/engineering management.

MIT in Cambridge, Mass., began its program in 1981. Director Rochelle Weichman says students have included computer science majors, systems development managers and principal software engineers.

Jonathan A. Bachman, now a software product manager at Electronic Book Technologies, Inc. in Providence, R.I., looked at both these programs before settling on Stanford. "They were more flexible than MIT. I was able to take seven courses in computer science — almost all of which focused on software product development — along with seven management courses," he explains. Both programs require a year to complete.

"You get about half the material in a typical MBA and about half of a typical master's in engineering," Bachman says. "When you're done [with the program], you know what you don't know in two different areas."

Such breadth may be just the thing for IS professionals, who must constantly weigh the merits of different technologies and changing business requirements.

Other schools with similar programs are the University of Phoenix; the Stevens Institute of Technology in Hoboken, N.J.; Case Western Reserve University in Cleveland; and the University of Minnesota in Minneapolis/St. Paul. The University of California at Berkeley

— Alan R. Earls



MIT professor Steve Eppinger teaches product development

Hot dog!

New Managers

**Congrats!
You're a
manager!**

By Alan R. Earls

You're a talented information technology pro. If you're not a manager already, somebody will ask you to become one soon enough. The change inspires feelings that range from elation to terror.

Suddenly, instead of relying on the boss or complaining about the boss, you are the boss. You're accountable for everything those slugs who report to you do. And you were one of those slugs just last week, so you know full well what it's like.

That's the terror. The elation comes from the increased responsibility, the chance to develop professionally and, let's not forget, the bigger paycheck.

Paul Thompson, newly minted as a project manager at U.S. Healthcare in Blue Bell, Pa., expresses a common concern. "I came straight from a technical position," he says. "I had to make sure the expectations were set for me and my superior." Thompson was concerned that despite his managerial responsibilities, his boss would still expect him to make the code tight. "It is a mind-set that must be changed," he says.

Thompson wrestled his own mind-set before accepting the job. "When you stay technically oriented, you have a career path that is clear," he says. "But management is much more open-ended. Once you make up your mind to take a management job, there should be no turning back."

Bud Baumann, now a division head for information at Cigna Reinsurance, a Cigna Corp. subsidiary in Hartford,

Conn., recalls a similar resetting of parameters when he got his first taste of management responsibilities in 1984. His first step was to project leader, a position that came with lots of responsibility but little real power. "I had to learn to convince people to do things for the good of the team," he says. "But if someone wasn't pulling their weight, you would still go in and do it yourself."

information services.

There, things were different. Although the persuasion skills he had acquired as a project leader came in handy, Baumann says it took a while to get the hang of delegating technical tasks and getting compliance.

Mark Cook began his first management position four years ago running a help desk in a government agency. This job eventually led to his current position as director of computing services at the Columbus School of Law in Washington. He says he knows exactly what the managerial challenge is: people. "You expect them to be cooperative," he says, "but they are worse than incompatible operating systems." In fact, he adds, "people will purposely do malicious things."

Cook says that to survive, he learned to be a good listener, figured out the difference between an employee and a personal friend and, in particular, taught himself to think before talking or sending electronic mail.

And managing people is only one facet of the management challenge, says Wayne Graves, who was recently appointed deputy information systems director at the Association for Computing Machinery in New York. "I came to this position from a systems analyst function. I expected that as a manager, I would be thinking mostly about people." Instead, Graves found, "I really had to keep an eye on the information itself because that is what other people needed from us."

Graves discovered that some of his department's major tasks no longer served users' needs. In fact, one of his first challenges was explaining diplomatically that "the work someone had been doing for years had been getting tossed into the garbage."

But never fear. Managers are often delighted with what they do. Suford Lewis, a national officer in the Association for Women in Computing, recalls fondly her introduction to management during the early 1980s. "It was a vivid couple of years that were mostly marked for me by delight and the terror that I would do something terribly wrong," she says. "I was always delighted to discover that I could suddenly do so much to move a project forward, yet I was terrified that I wouldn't have enough real power to have a permanent effect."

Getting past that queasiness and learning that even with feet of clay, a manager can make a difference, is the big payoff.

Earls is a freelance writer in Franklin, Mass.

**What the
!#@* do I
do now?**



Baumann next became an independent contractor. It wasn't until 1991 that he landed what he describes as his first "real" management position: director of Cigna's risk

Executive Track



Kathy Cruz is the new chief information officer and vice president of information services at **VeriFone, Inc.**, a provider of transaction automation systems in Redwood City, Calif. She will report to Joseph M. Zaelit, the company's vice president of finance and administration and chief financial officer.



William E. Eager is joining **CSC Consulting and Systems Integration** as a partner. His Cincinnati-based practice will focus on re-engineering and IS organizational effectiveness. Eager is a former senior vice president and CIO of Community Mutual Insurance Co.



The Arbitron Co. has appointed **Stan Burrows** as CIO. Previously, Burrows was a senior software engineering manager at Lotus Development Corp. in Cambridge, Mass. Burrows will be responsible for all software development at the New York-based media information company.



Melodie Mayberry-Stewart was recently named vice president and CIO at **Beth Israel Medical Center** in New York. In addition to IS, including clinical systems, she will oversee telecommunications network development at the health care center.

For the past four years, Mayberry-Stewart was vice president and CIO at St. Thomas Hospital in Nashville. Prior to that, she worked for IBM.



Marc Rubinger is the new CIO at **Genesis Health Ventures** in Kennett Square, Pa. He will report to Michael R. Walker, the health care provider's chairman and CEO. Rubinger was previously a vice president of IS at Shared Medical Systems.



John R. Witsken has been named staff director and CIO at the **Institute of Electrical and Electronics Engineers, Inc.** He will be responsible for managing the Piscataway, N.J., technical society's computing, communications and application development. Previously, Witsken worked at Bell Communications Research, Inc.

We asked a dozen information technology managers, some recent arrivals and others with several years' experience, what advice they would offer newcomers. Here are the common themes:

- Don't be afraid to hire people more talented than you.
- Some of your decisions will always backfire.
- Your peers and superiors are much more likely to stab you in the back than are your direct reports.
- You can't know it all. Find sources of expertise you can rely on.
- As a manager, you shouldn't be the one who saves the day. Instead, hire day-savers.
- Technical people tend to seek technical solutions. As a manager, you must make choices based on cost and time, not technical elegance.
- Figure out what skills are weakest on your team so you don't get blind-sided in that area.
- Don't sit around waiting for the perfect solution to walk in your office.

Decisions, decisions. Do we rave that the Digital MultiStack System has the most robust functionality in the industry? That it delivers local, remote and Internet access—not to mention wireless—so it's ideal for even the most widespread enterprises? Or should we talk dollars and cents: a starting price less than \$50 per port, well below HP, 3COM and Bay Networks? Should we talk about Digital MultiStack's exceptional scalability? (It lets you add routers, switches, access servers, traffic analyzers, bridges and hubs as needed. Up to 16 hot-swappable hubs and 232 ports. So your network stays up and running, yet grows as your company does.)

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John Dodge

PC WEEK DEC. 18, 1995



Doh!

Ten dumb mistakes. That's what the Center for Project Management in San Ramon, Calif., found when it examined 24 projects in nine information technology organizations. So many departments reported making the same goofs that the center compiled a list.

When the list was complete, the center presented it to 50 conference attendees and asked them to grade their organizations on each mistake. Average grades ranged from C+ to D.

In all fairness, the information technology organizations that were originally studied were severely late or over budget with projects; they had turned to the center for help. Nevertheless, do any of these doozies ring a bell in your department?

Ten dumb mistakes

- 1 Mistaking every half-baked idea for a viable project.
- 2 Overlooking the stakeholders, forgetting the champions and ignoring the nemeses.
- 3 Not assessing project complexity.
- 4 Not developing a comprehensive project charter.
- 5 Not developing a comprehensive project plan.
- 6 Not designing a functional project organization.
- 7 Accepting or developing unrealistic and unachievable estimates.
- 8 Accepting status reports that contain mostly "noise" and not enough "signal."
- 9 Looking back and not ahead.
- 10 Not following a robust project process architecture.

New ideas, anyone?

Would you like to hear how companies such as Toyota and AT&T gather customer feedback and turn it into new and better products? Or how General Motors and Becton Dickinson benchmark themselves against competitors? And would you like to hear it straight from managers at these companies?

Then there's an event you ought to check out: the third conference on "Defining New Products & Services: Best Practices for On-Target, On-Time Results." It's being held in Orlando, Fla., March 31 to April 3.

You probably won't find many information systems managers there. The sponsor, The Management Roundtable in Waltham, Mass., tends to draw marketing, product development and manufacturing types to its events. But if you're looking for new ways to use information to build customer-pleasing products and services, this event could be just the thing. For more information, call (800) 338-2223.



April Workshops

Most workshops are offered later in the year in other cities. To find the time and location most convenient for you, call the contact phone number.

Learning Today's Team-based IS Organization. Providence, R.I., April 1-2; Boston, April 11-12. Fee: \$750. Contact: QED Information Sciences, Inc., Wellesley, Mass. (800) 395-1109.

Re-engineering the Computer Help Desk. New York, April 1-2; Washington, April 18-19. Fee: \$895. Contact: Data Tech Institute, Clifton, N.J. (201) 478-5400.

Communication and Interpersonal Skills: A Seminar for Technical Professionals. New York, April 1-3; San Francisco, April 15-17; Atlanta, April 22-24. Fee: \$1,195 to \$1,375. Contact: American Management Association, New York, N.Y. (800) 262-9699.

Specifying and Managing Software Requirements. Boston, April 2-5. For project managers who develop requirements specifications. Fee: \$1,495 to \$1,995. Contact: The Learning Tree International, Inc., Reston, Va. (800) 843-8733.



Doug Engelbart:
three buttons

ton, Va. (800) 843-8733.

Project Management: Skills for Success. Los Angeles, April 2-5; Boston, April 23-26. Fee: \$1,495 to \$1,995. Contact: The Learning Tree International, Inc., Reston, Va. (800) 843-8733.

Measuring and Controlling Software Projects. Orlando, Fla., April 8-10. Fee: \$845 to \$945. Contact: Quality Assurance Institute, Orlando, Fla. (407) 363-1111.

Process for Installing a TQM System. Columbus, Ohio, April 8-12. For IS professionals implementing a total quality management system. Fee: \$1,195 to \$1,395. Contact: Quality Assurance Institute, Orlando, Fla. (407) 363-1111.

Business Process Re-engineering: Strategies, Techniques and Tools. Los Angeles, April 9-12. Fee: \$1,495 to \$1,995. Contact: The Learning Tree International, Inc., Reston, Va. (800) 843-8733.

Effective Skills for Technical Managers. Boston, April 9-12; Washington, April 23-26. Fee: \$1,495 to \$1,995. Contact: The Learning Tree International, Inc., Reston, Va. (800) 843-8733.

Identifying and Confirming User Requirements. Boston, April 9-12; Washington, April 30-May 3. For those responsible for identifying user needs in a project. Fee: \$1,495 to \$1,995. Contact: The Learning Tree International, Inc., Reston, Va. (800) 843-8733.

Systems Analysis and Design for Information and Business Professionals. Chicago, April 9-12. Fee: \$1,350 to \$1,550. Contact: American Management Association, New York, N.Y. (800) 262-9699.

Improving Your Internal Consulting Skills: For IS Professionals. New York, April 10-12; Phoenix, April 24-26. Fee: \$1,295 to \$1,490. Contact: American Management Association, New York, N.Y. (800) 262-9699.

tion, New York, N.Y. (800) 262-9699.

Information Systems Project Management. New York and Seattle, April 10-12; Chicago, April 17-19; Washington, April 24-26. Fee: \$1,295 to \$1,490. Contact: American Management Association, New York, N.Y. (800) 262-9699.

Understanding Client/Server Computing: Planning, Designing and Implementing a Client/Server System. Orlando, Fla., April 11-12; Atlanta, April 18-19; Detroit, April 25-26. Fee: \$895. Contact: Data Tech Institute, Clifton, N.J. (201) 478-5400.

Communicating with IS Clients and Customers. Fairfield, N.J., April 15-16; Philadelphia, April 22-23. Fee: \$750. Contact: QED Information Sciences, Inc., Wellesley, Mass. (800) 395-1109.

Internal Consulting: Creating Customer Satisfaction. Boston, April 15-16. Fee: \$750. Contact: QED Information Sciences, Inc., Wellesley, Mass. (800) 395-1109.

Strategic Information Systems Planning. Washington, April 15-17. For senior managers. Fee: \$1,350 to \$1,550. Contact: American Management Association, New York, N.Y. (800) 262-9699.

The Crossing the Chasm/Inside the Tornado Seminar Series. Redwood City, Calif., April 16-17. For managers and those who incorporate information technology into the enterprise. Fee: \$1,285 to \$1,395. Contact: Marketwise, Inc., Boulder, Colo. (800) 300-3846.

Workflow: Joining the Islands of Automation. Denver, April 18-19. Fee: \$1,095 to \$1,295. Contact: Delphi Consulting Group, Boston, Mass. (617) 247-1025.

High Tech Procurement Workshop. Short Hills, N.J., April 22-24. Fee: \$1,395. Contact: International Computer Negotiations, Inc., Winter Park, Fla. (407) 740-0700.

Information Management: The Next Generation. Denver, April 22-25. Fee: \$475 to \$1,950, depending on days attended. Contact: Delphi Consulting Group, Boston, Mass. (617) 247-1025.

Re-engineering: The Leadership Perspective. Chicago, April 24. For senior managers involved in or considering a re-engineering effort. Fee: \$1,500. Contact: Hammer and Co., Cambridge, Mass. (617) 354-5555, ext. 106.

Software: Issues, Contracts, Negotiations. Short Hills, N.J., April 25-26. Fee: \$995. Contact: International Computer Negotiations, Inc., Winter Park, Fla. (407) 740-0700.

Managing Telecommunications: Technologies Your Company Can't Do Without. Atlanta, April 25-26. Fee: \$1,250 to \$1,435. Contact: American Management Association, New York, N.Y. (800) 262-9699.

Quality Review Techniques for Information Technology Professionals. Atlanta, April 29-30. Fee: \$1,195 to \$1,375. Contact: American Management Association, New York, N.Y. (800) 262-9699.

Leasing Negotiations Workshop. Chicago, April 29-May 1. Fee: \$1,395. Contact: International Computer Negotiations, Inc., Winter Park, Fla. (407) 740-0700.

Calendar announcements should be submitted at least six weeks prior to the event and include the title of the event, dates, location, theme or focus, keynote or major speakers, principal topics and a contact person, organization and phone number.

SEND ANNOUNCEMENTS TO:

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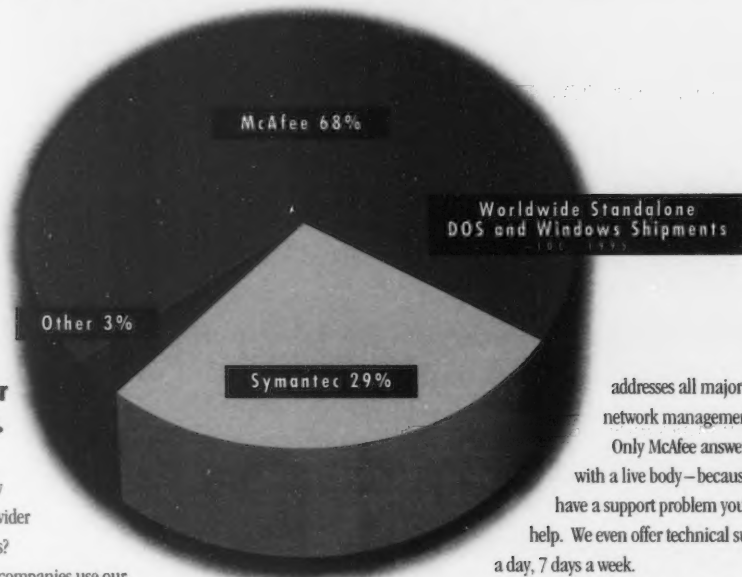
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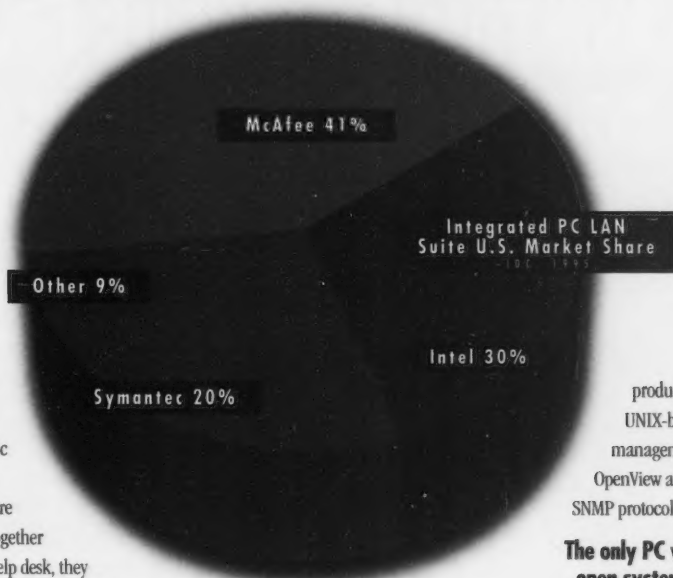
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Buyer's Guide to RAID

RAID

to Order

You can have it your way:
It's open or proprietary.
... It's fast or fat. ... It's
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you like it, RAID's becoming
the only way to go. ...

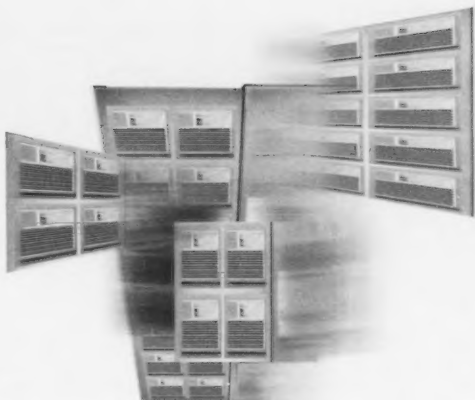
By Cathleen Gagne

If the word RAID conjures up images of a deadly hornet or cockroach spray as it originally did for me, then you may be in for a pleasant surprise. RAID (redundant arrays of inexpensive disks) is a lot of things to a lot of people, but it doesn't burn your nostrils, damage the ozone layer or kill ants.

The RAID storage market is exploding: International Data Corp. (IDC), a market research firm in Framingham, Mass., reports that this area grew 71% from 1994 to 1995. The expansion was fueled by strong open systems and mainframe market performance, according to IDC's "1995 DASD Subsystem Year in Review."

There are plenty of reasons for growth, according to Thomas B. Lahive, an analyst at IDC. They include the following factors:

- Users are tired of losing data.



- Hard disk drive prices have dropped.
- Some RAID is being configured internally.
- Client/server environments are taking a more mission-critical tack.
- There are more RAID alternatives.
- RAID is no longer considered a risky technology.

RAID storage systems come in all varieties; users can be more selective with their purchases and get what they need. *Computerworld* offers a closer look at the mainframe and open systems markets, the players, pricing and projections for the next year or so. Options are plentiful, which makes it an interesting buyer's market. Turn to page 90, and see for yourself.

Inside

This **Buyer's Guide** takes a separate look at the mainframe and open systems RAID markets. It includes vendor roundups, a glossary and resources for users who need more information. See pages 90 and 91.



Firing Line profiles Storage Computer's Unix RAID, a unique product that is starting to get some respect from users and experts. See page 94.



The **Buyer's Guide Satisfaction Scorecard** shows that users are pleased with their mainframe RAID products. More than 70% of the users interviewed said they would buy their systems again. See page 96.

Buyer's Guide to RAID

Mainframe

The way to go

RAID stands for redundant arrays of inexpensive disks. Some people use the word "independent" in place of "inexpensive." It is a category of disk arrays (two or more drives that work together) that provide increased performance and several levels of error recovery and fault tolerance.

Disk mirroring. The recording of redundant data for fault-tolerant operation. Data is written on two parts of the same disk, on two separate disks in the same system or on two separate computer systems.

Disk striping. A type of disk-array mapping in which consecutive stripes of data are mapped round-robin to consecutive array members. A striped array, or RAID Level 0 array, provides high I/O performance at low cost. But it also offers lower net data reliability than any of its member disks.

Parity bit. An extra bit attached to the byte, character or word that is used to detect errors in transmission.

Cache. A dedicated bank of high-speed memory or a reserved section of regular memory that is used to improve performance. Cache is a very expensive method of increasing RAID performance.

Sources: Electronic Computer Glossary, 1995, Alan Freedman; Newton's Telecom Dictionary, 1993, Harry Newton; The RAIDBook: A Source Book for RAID Technology, second edition, by the RAID Advisory Board.

Mainframe RAID is steadily gaining a foothold as the storage medium of choice. Users and analysts insist that RAID is the safest way to protect data, and it's also the way everything is going.

"With RAID, you're a lot safer than just running naked," says Stuart Schuman, director of data processing at the Ramada Milford Plaza Hotel in New York. Schuman uses IBM's Ramac.

"We crashed so bad once with the former disk drives that my backups were no good, and we lost a lot of money in business — it was just unbelievable," he says.

RAID is critical to the hotel industry, which operates 24 hours a day, seven days a week, he says.

RAID is a category of disk arrays in which two or more drives work together to provide increased performance and various levels of error recovery and fault tolerance. Most RAID units are based on racks of 3½ drives that provide 2G or 4G bytes of capacity each.

Backups

Data can be protected in several ways, depending on which RAID level is used (see RAID levels, page 94).

Some of the levels, such as RAID Level 1 (disk mirroring), are considered expensive because they involve 100% duplication of data, which typically doubles the cost per megabyte.

But this is changing. A recent report from Meta Group, Inc., a market research firm, predicts dramatic price cuts during the next two years: The price per megabyte for high-performance mainframe RAID is expected to drop from \$1.74 today to 43 cents by the end of 1998 (see chart, page 91).

And the market should pass a major threshold this year: All IBM-compatible mainframe disk storage purchases this year will involve RAID devices, according to a recent report by International Data Corp. Terabytes shipped for mainframe RAID increased dramatically last year and will increase this year as more and more companies upgrade their IBM 3380- and 3390-type 10½-in. disk systems to RAID, says Fara Yale, an analyst at Dataquest, Inc. in San Jose, Calif.

"Typically, a site will start with just one subsystem while they try out RAID and continually upgrade other parts of their [direct-access storage device] farms," Yale says. "It's rare you would see a site completely convert all of [its] DASD over to RAID in one fell swoop," she says.

Compared with the multitudes of vendors in the Unix RAID market, mainframe RAID is pretty straightforward. There is only a handful of providers to watch: IBM, EMC Corp., Storage Technology Corp., Hitachi Data Systems Corp. and Amdahl Corp.

Yale says this will be a relatively quiet year for mainframe RAID vendors, as they "try to get a foothold in the market to expand a revenue base."

"You may see some capacity enhancements late in the year, but even that's not highly likely," she says.

But expect a new round of announcements for the System/390 market next year.

— Cathleen Gagne



Amdahl's Spectris is due early this year

The players

Here's a snapshot of the top mainframe RAID players and commentary by Carl Greiner, vice president and services director at Meta Group, Inc. in Westport, Conn.

Symmetrix EMC Corp.

Hopkinton, Mass.

(800) 258-5528

<http://www.emc.com>

EMC has stepped out and taken leadership from Amdahl, Hitachi and IBM. EMC's simple approach involves putting a lot of cache in front of the array of small disks. This [results in] great performance and uses the simple mirroring technique to provide high availability. Subsequently, [EMC] has come along with RAID-S, which is a RAID 4/5 combination. They've also come out with data migration services, which automatically move data from older devices to the new ones, and you never take the data off-line.

Ramac IBM

San Jose, Calif.

(800) 426-3333

<http://www.ibm.com>

IBM has been very, very quiet lately. All it has is a simple RAID 5 product [that doesn't have] a lot of new functions. IBM has been talking about Seastar, which is the box, and Seascope, which is the architecture. Delivery for this product is forecast for late '97 or early '98.

Iceberg Storage Technology Corp.

Louisville, Colo.

(800) 456-7684

<http://www.stortek.com>

StorageTek has a RAID 6-plus product, which

compacts and compresses data as it moves in and out. This gives [StorageTek] the ability to compact and compress — at a rate of three times or higher — 100G bytes of storage, which translates to 300G bytes. StorageTek charges you at 300G bytes even though you're only buying 100G bytes. So it's virtual disk, basically.

Spectris Amdahl Corp.

Sunnyvale, Calif.

(800) 538-8460

<http://www.amdahl.com>

Amdahl hasn't shipped Spectris and probably won't until the end of the first or second quarter. Spectris is a RAID 3 implementation. RAID 3 normally is good for big data files when you're [handling] large bulk data. Users normally have many little data sets that come off the database; we're not sure how it'll perform.

7700

Hitachi Data Systems Corp.

Santa Clara, Calif.

(800) 227-1930

<http://www.hdshq.com>

Hitachi released the 7700. The company is still going through a lot of shakeout, but it's starting to settle down. The 7700 offers good performance and a very scalable server. It will have enterprise capability, which means it will have SCSI capability by 1997. It's the first step. They're late.

The **Unix** Market

Value is the key

Apply the usual keywords — bigger, cheaper, faster — to the coming year in the open systems RAID sector. Users will get more for their money when they buy RAID devices for Unix or PC-based servers.

Oh yes, they also will get two totally new architectures. Users won't get to choose directly between those architectures; their systems vendors will. But users should see performance gains with either one.

"With all these robust applications coming on the marketplace, such as video on demand and all the high-performance systems, these new storage subsystems will be more in tune with the pro-

cessors. Storage will become less of a hindrance. Most users don't realize that system performance is being degraded by storage," says Thomas B. Lahive, a senior analyst at International Data Corp.

At issue is which next-generation RAID subsystems will be based on the Fiber Channel Arbitrated Loop (FCAL) standard that is offered by the Fiber Channel Loop Committee and which will be based on the copper-based Serial Storage Architecture (SSA).

Many drive makers and computer systems vendors are boosting FCAL, which is expected to debut in RAID systems in the third quarter.

IBM is promoting SSA and already offers the archi-

ture in its 7133 storage subsystem that is used with IBM RS/6000 servers. IBM says it plans to announce other vendors' adoption of SSA and the availability of SSA-based drives and RAID systems for other computing platforms. Both architectures use a loop, or ring, architecture; the key differences are what the systems are based on — SSA on copper wire and FCAL on fiber-optics — and where the intelligence resides in the RAID subsystem.

"With SSA, you can get it now, and the cost is cheaper. Fiber will be out three quarters from now and will cost more," Lahive notes.

But SSA and FCAL will cost about the same in the long term, he says. Both will

be faster and easier to implement than today's SCSI technology, he says.

Another analyst emphasizes that SSA and FCAL will concern systems vendors instead of IS managers.

Jim Porter, president at Disk/Trend, Inc. in Mountain View, Calif., says users should care about the capabilities of what they buy, not the underlying architecture.

Lahive says the following are other developments users can watch for in open systems RAID:

- Capacities will double annually, which will cut the cost per megabyte almost in half. Today's standard is a 3½-in. disk that holds 4G bytes of data. That will double to 8G bytes in the third quarter and will double

again to 16G bytes a year later.

- More storage management tools. These should include storage optimization capabilities, such as those in Hewlett-Packard Co.'s Auto-raid, which allows users to change RAID levels depending on their needs. Also watch for features that support reallocation of cache and carry into open systems some of the hierarchical storage capabilities that are already available in the mainframe environment.

- New generations of processors, such as Intel Corp.'s 133-MHz Pentium and P6 chips and the latest RISC chips, will appear as controllers. That will improve RAID subsystem performance. —James Connolly

ORGANIZATIONS

The RAID Advisory Board

13 Marie Lane
St. Peter, Minn.
50802-9423
(507) 931-0967
(507) 931-0976 (fax)
<http://www.andataco.com/rab>

"Dedicated to promoting the understanding and utilization of RAID and related storage technologies."

NEWGROUP

comp.arch.storage

BOOKS

The RAIDbook

A sourcebook for RAID technology. RAID Advisory Board, 1995, \$29.95 (free to board members)

The RAIDprimer

A brief introduction to RAID technology. RAID Advisory Board, 1995, \$4.95 (free to board members)



Data General's Clarion features extensive connectivity to open systems platforms

Open up

Here's a sampling of the growing pool of independent Unix RAID suppliers

EMC Corp.

Hopkinton, Mass.
(800) 258-5528
<http://www.emc.com>

Data General Corp.

Westboro, Mass.
(800) 328-2436
<http://www.dg.com>

Box Hill Systems Corp.

New York
(800) 727-3863
(212) 989-4455

Andataco

San Diego
(800) 334-9191
<http://www.andataco.com>

Cambex Corp.

Waltham, Mass.
(800) 292-7472

Storage Dimensions, Inc.

Milpitas, Calif.
(800) 765-7895
<http://www.storagedimensions.com>

Storage Computer

Nashua, N.H.
(603) 880-3005
<http://www.storage.com>

Storage Technology Corp.

Louisville, Colo.
(800) 456-7689
<http://www.stortek.com>

Storage Concepts, Inc.

Irvine, Calif.
(800) 525-9217

Nobody pays retail

There saw "Nobody pays retail" lives on in the RAID market. There is room to negotiate price, whether it's for open systems or mainframes. IDC analyst Thomas Lahive offers the following tips for negotiating the best price for RAID:

- If you're in the lower end of the market (under 100G bytes of capacity), there are so many competing vendors that you can play one off the others. There is less flexibility in the mainframe market because there are fewer suppliers, but there is still room for negotiation.

- If list prices run \$1.80 to \$3 per megabyte, negotiated street prices may be as low as 90 cents in basic open systems configurations and \$1.40 to \$1.50 per megabyte for mainframe products that feature high performance and high availability.

- Remember to get it in writing. "Always remember the fact that open systems pricing is about 90 cents per megabyte. If [the vendor is] trying to get more than that, make them show you why they are charging a premium, why they will improve performance by a certain amount, like 20%, and make them put it in writing," Lahive says.

- Make sure that you know what you're buying. You must question vendors about how they're pricing RAID. Ask the vendors whether you're paying for the usable capacity or the total capacity.

(<http://www.computerworld.com>) FEBRUARY 26, 1996 COMPUTERWORLD

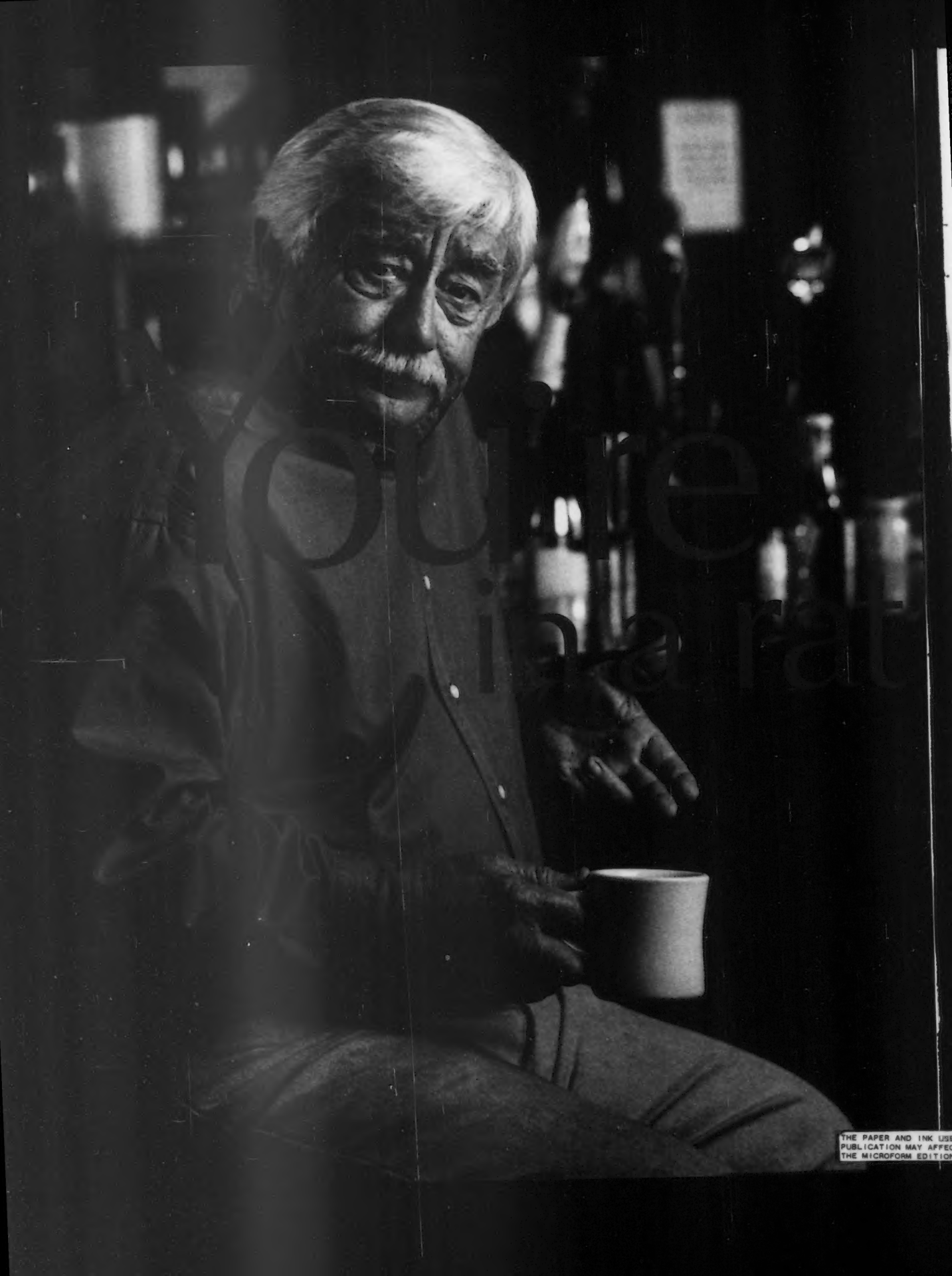
The projected pricing patterns for "high-performance" mainframe RAID follow a user-friendly downward curve, which is typical of the overall RAID market.

RAID pricing

Projected price per megabyte of storage

1st quarter 1995	2nd quarter 1997	4th quarter 1998
\$1.74	\$0.92	\$0.43

Source: Meta Group, Inc.



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THE QUALITY OF THE MICROFORM EDITION

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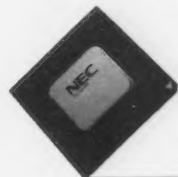
"Sounds very interesting," I said, trying not to sound too patronizing. "But new things tend to make me nervous." And with that, I excused myself.

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PECT THE QUALITY OF
ION.

RAID levels

Here's a basic look at what each of the RAID levels means. It's important to know that RAID 6 isn't necessarily better than RAID 0. The levels indicate the way data is distributed and the way redundant capacity is implemented.

RAID as a concept was first defined in 1987 by engineers at the University of California at Berkeley. These engineers described five levels of RAID configurations (RAID 1-5). RAID 0 and RAID 6 have since been added.

Level 0.

Disk striping without parity information.

Level 1.

Disk mirroring or shadowing. One disk drive and an exact backup.

Level 2.

Disk striping at bit level and parity information.

Level 3.

Disk striping at the byte level and one disk per set for parity information.

Level 4.

Similar to RAID 3, but stripes data in large chunks.

Level 5.

Disk striping in sequential blocks across all disks with parity data.

Level 6.

RAID 5, plus redundant disk controllers, fans, buses and more.

Sources: *Hammer's Telecom Dictionary*, 1995, Harry Newton

Buyer's Guide to RAID

RAID 7



wins over skeptics

By Kevin Burden

"Our first reaction was, 'RAID 7? This is snake oil, and these guys are charlatans,'" says Dan Austin, network administrator at a systems software company in Santa Clara, Calif. But he soon accepted RAID 7 when he learned of its architectural advantages:

- I/O data paths are asynchronous.
- Device hierarchy and data bus utilization are also asynchronous.
- An embedded process-oriented operating system manages all I/O transfers across drives.

Yes, RAID 7 takes its place next to RAID Levels 0-6 (see explanation of RAID levels at left), and it's recognized by the RAID Advisory Board as a legitimate level.

But RAID 7 isn't entirely new. Storage Computer Corp. in Nashua, N.H., has been shipping RAID 7 Storage Servers since 1992. To date, it is the only company that offers this level.

RAID 7 servers can be concurrently hooked to a variety of Unix and midrange systems. They are available in desktop, rack-mount and console models.

The result is a high-performing open systems architecture that users graded highly for scalability, speed and multiprocessor support. But users expected more functionality from its internal software.

This evaluation was completed through in-depth interviews with four RAID 7 users. Each user graded his satisfaction with the storage servers in the following categories:

Ease of use

A B A B

You either like it or love it, users say. Those who love it rave about RAID 7's installation utility. "Installation is self-explanatory. I didn't read any manuals and only asked tech support for recommended setting for our environment," Austin says. "It doesn't require system-level drivers either," which allows for a more open server architecture, he says.

Users who like it also say setup is easy, even when connecting to different platforms. But they only gave B's partly because RAID 7 needs to be taken down when users reallocate partitions. This isn't any different from other RAID systems, according to Thomas Lahive, a senior analyst at International Data Corp.

But because RAID 7 runs configuration software within itself, "I expect it to be able to make these changes on the fly," says Michael Frederick, senior systems analyst at the University of Houston.

RAID 7 also requires users to reclaim freed-up space when partitions are moved. "It doesn't automatically do so. That space is in limbo if you don't do it yourself," Austin says.

Evaluators

- Systems software company
- University
- Oil and gas company
- Telecommunications equipment company

Grading system

- Excellent **A**
- Good **B**
- Fair **C**
- Poor **D**
- Very Poor **E**

Performance

A A+ A A

Every user interviewed was ecstatic about RAID 7's performance, partly because it blows away the older direct-access storage device (DASD) systems they had used. But mostly the users were ecstatic because RAID 7 has architectural characteristics that make it scream. RAID 7 compliance means each drive and interface has independent data paths that are connected to a high-speed data bus. This allows independent transfers to and from the central cache, which gives RAID 7 exceptional performance. "Our Pentium server is now streaming data at rates we never expected to see under Banyan Vines," Austin says.

Frederick, who boots his Windows NT servers directly off the RAID 7 box, says it does so with incredible speed. "Our NT server with a good SCSI disc system took between three and four minutes to boot. Now it takes only 45 seconds."

Scalability

B+ B A A

The console models use up to 48 drives for a total capacity of 420G bytes. Expansion options top the line at 1.3T bytes, which users feel is a very comfortable ceiling.

Scalability is very good in one way and restrictive in another, Frederick says. "You can plug any vendor's SCSI drive into RAID 7. In that way, it scales easily and fast," he says. The line supports 3½- and 5¼-in. disks of any capacity from various manufacturers. But RAID 7 will default to the smallest drive's capacity if drives are mixed.

It's restrictive "because it uses many proprietary products [such as] disk and host adapters and custom boards that lock you to Storage Computer," Frederick says. None of the evaluators disclosed availability problems; Frederick's concern is the high cost history of proprietary products.

Support and maintenance

B B- A C

Evaluations are mixed regarding support. RAID 7 is easy to maintain, which is why the support category fared as well as it did. "It's like supporting a toaster oven — there's nothing to it," Austin says. But Storage Computer's technical support is why grades weren't higher.

Maintaining RAID 7 systems with in-house staffers is much easier than supporting older DASD units, according to a user from an oil and gas company. "If a disk failed in my other units, I would have to take the server down then unplug all the SCSI drives to remove the bad one from the chain," he says. Nothing comes off-line when a RAID 7 disk fails. "I pull the failed disk out, plug a new disk in, and its software configures and rebuilds it." It can even be set up so it configures the replaced disk after-hours so there is no chance end users will be disrupted.

Storage Computer will need to strengthen its own support staff if it wants to truly comfort its users. "Their technicians weren't quite up to speed when we first installed it, but they've gotten a little better," Austin says. Channeling questions through distributors isn't the solution either. "I've never been able to contact their support team. I started to really scream through my distributor, who says they have the same problem getting through to [Storage Computer]," Frederick says.

Evaluators say they have had success contacting Storage Computer through its bulletin board.

Value

B B B B

RAID 7's cost figures to be almost \$1 per megabyte for the four evaluators. Expensive? Yes, say three of the four users. But once they factored its cost against its advantages, price was overlooked. "It went from being expensive to being nothing when we looked at what it would do for us," Austin says. "I expected IS management to be happy, but even users and senior business management have noticed the improved [application] performance. Everyone is a little more productive and happier," he says.

Storage Computer responds

Repartitioning on the fly
Repartitioning while the server is up requires enhancements to the array management software. (Storage Computer didn't indicate any plans to make this improvement.)

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Buyer's Guide to RAID

RAID

Stacks up



The varied approaches of Ramac, Symmetrix and Iceberg score well with diverse users

By Kevin Burden

Mainframe RAID buyers aren't overwhelmed with choices — there are three major vendors and a handful of others trying to break in to the market. But buyers are finding the right match for their needs.

EMC Corp.'s Symmetrix line is known for its stellar performance — and its high price. Users choose IBM's Ramac for its RAID Level 5 implementation, which provides a comfortable mix of reliability, performance and value. And Storage Technology Corp.'s Iceberg is noted for its extreme fault tolerance.

Luckily, no matter what your priorities are, it's tough to make a bad choice. More than 70% of all users interviewed said they would buy the same systems again. *Computerworld* contracted First Market Research in Austin, Texas, to survey at least 40 users of each vendor's system. The goal was to determine what prompted users to choose their system and how well it performed overall.

Symmetrix

Before EMC introduced RAID-S to its Symmetrix line, the products used RAID 1 mirroring technology, which delivers the highest performance of

any RAID level, says Thomas Lahive, a senior analyst at International Data Corp. RAID-S is a RAID Level 4/5 implementation for mainframes and open systems.

RAID 1 replicates all data at least once on a separate disk. Its performance advantage comes from writing data in its entirety to a disk instead of stripping it across multiple disks. Twenty of the 46 EMC users interviewed said "speed" was the top reason they chose Symmetrix, nearly twice as many as Ramac or Iceberg users. And 16 of the 20 awarded speed A's; the rest gave B's.

Interest in reliability rides shotgun to speed rather than taking a back seat. Fourteen out of 19 users who cited reliability as an important feature gave it the highest grade they could.

Price is Symmetrix's downfall. "RAID 1 is very expensive because of the volume required to duplicate everything," Lahive says. How much more expensive? "[Ten percent] to 15% premiums over RAID 5 systems," says Richard Blaschke, vice president of mainframe marketing at EMC. But EMC loves to negotiate. Eighteen out of 19 users gave A's or B's to the price they worked out.

Iceberg

Iceberg users want the highest data reliability and fault tolerance possible and are less concerned

with speed. Iceberg is RAID Level 6, which means all data is updated to two parity schemes instead of one, like the RAID 5 implementation in Ramac.

Two disks can take hits in a dual-parity system without losing data, which makes RAID 6 the most fault tolerant of the RAID levels.

"Data integrity is our No. 1 concern. Iceberg's

Overall satisfaction

Percentage of users who gave grades	A Very good	B Good	C Average
Symmetrix	65%	24%	4%
Iceberg	61%	24%	10%
Ramac	56%	34%	10%

Some users didn't offer an opinion. None gave "poor" grades.

reliability has lived up to and beyond its reputation," says Joe Dawson, director of information systems product services at Minnesota Mutual Life Insurance Co. in St. Paul.

Writing to dual-parity blocks hurts Iceberg's speed, although several users acknowledge that they are willing to trade performance for improved fault tolerance. When asked what was more important, 71% of Iceberg users said fault tolerance was most critical; only 29% cited speed.

Iceberg gained fans for potential capacity. StorageTek had more users (eight) who said overall capacity played a significant role in their decision than IBM (three) or EMC (three). Part of the reason points to StorageTek's Virtual Storage Architecture, Lahive says. A virtual direct access storage device (DASD) eliminates the space gaps that conventional DASD puts between data for the read/write mechanism to work. More data is stored per gigabyte.

Ramac

Ramac users hold reliability in the same high regard as StorageTek users, but they are less willing to sacrifice speed to get it. Like Iceberg users, 40% of Ramac users said reliability was their deciding factor. But unlike Iceberg, which received favorable grades from the full 40%, Ramac had three users who gave it a C.

Speed is Ramac's second most alluring trait. Users said they were impressed by its speed but were more impressed that it performed up to IBM's promises. Overall, nearly three quarters of the users said Ramac lived up to IBM's presale promises; 10% said it exceeded them.

Price, however, had little effect on purchase decisions. Ramac garnered the smallest number of users (12) who said negotiated price influenced their decision, and five considered the price only average.

Burden is *Computerworld's* senior researcher, Firing Line/Scorecard.

Snippets

A sampling of comments from users:

Symmetrix

Jim Flock, vice president of operations, Home Box Office, Inc., New York
"Symmetrix calls EMC before we know there is a problem, but it should also notify the user."

Deidrich Towne Jr., technical analyst, Niagara Mohawk Power Corp., Syracuse, N.Y.
"EMC tripled the results of the other vendors in our own performance tests."

Ramac

Stuart Schuman, data processing director, Ramada Milford Plaza Hotel, New York
"We would like Ramac to get closer to fault-tolerant processing."

Dennis Johnson, systems engineer, St. Vincent's Medical Infirmary, Little Rock, Ark.
"Ramac delivered the best value when we priced it against EMC."

James Hanna, centralized computer services supervisor, Nebraska Public Power District, Columbus, Neb.
"Ramac's controller it inherited from the 3990 DASD is getting dated."

Iceberg

Mary Carpenter, assistant vice president, Wells Fargo Bank, Concord, Calif.
"Iceberg was difficult to install, but it works the way it's supposed to."

Reliability counts

Users have different priorities, but they all rank reliability first or second



Symmetrix

EMC Corp.
Hopkinton, Mass.
(800) 258-5528
<http://www.emc.com>
(46 users surveyed)

USER PRIORITIES
In order of importance

1. Performance/Speed
2. Reliability
3. Price negotiated



Iceberg

Storage Technology Corp.
Louisville, Colo.
(800) 456-7689
<http://www.storitek.com>
(41 users surveyed)

USER PRIORITIES
In order of importance

1. Reliability
2. Price negotiated
3. Performance/Speed



Ramac

IBM
San Jose, Calif.
(800) 426-3333
<http://www.ibm.com>
(50 users surveyed)

USER PRIORITIES
In order of importance

1. Reliability
2. Performance/Speed
3. Price negotiated

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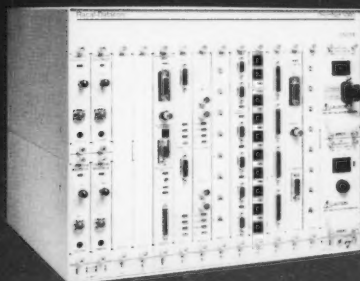


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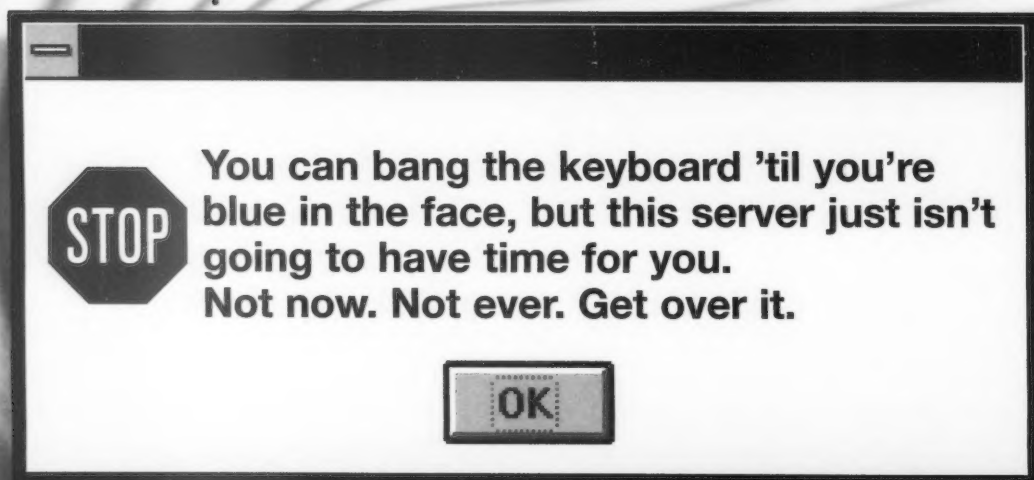
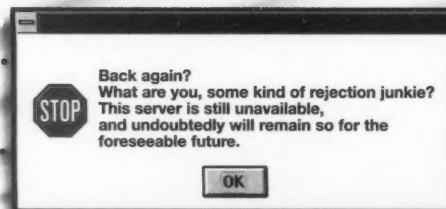
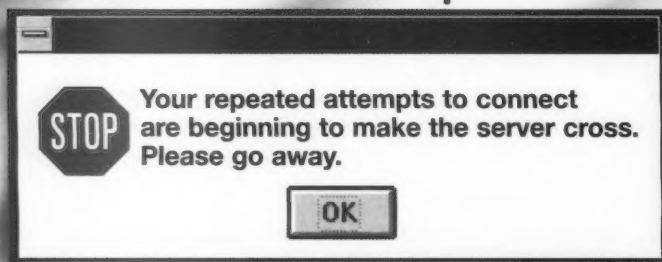
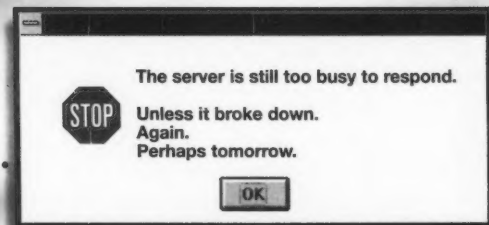
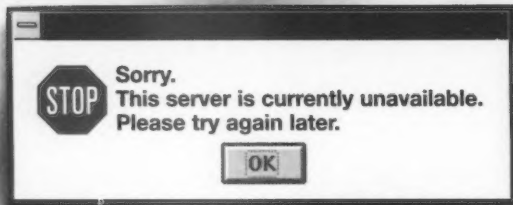
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In Depth

Look Out, Here Comes

Cost is just one reason U.S. companies are looking to the subcontinent for software development. Jaikumar Vijayan, Computerworld's senior writer for PC hardware, spent some time in-country talking to the people who are putting India on the world's software map.

At 23, Ashok Shantha Narendra Kumar is on the fast track. A recent computer science graduate from one of the best schools in India, Naren, as he's known, is a hotshot programmer at Bangalore-based Infosys Technologies Ltd., one of the most respected contract programming firms in the country. He hasn't been to the U.S. yet, but will likely visit soon.

Programmers like Naren, twentysomething and ambitious, are hotter than Indian curry in a market that can't seem to churn them out fast enough. Starting salaries average 150,000 rupees a year. High by Indian standards, that's less than \$4,500 a year, or about one-tenth of what a comparable U.S. programmer makes.

For that reason, Naren represents the competition — some would say unfair competition — for people such as Julie Cairns-Rubin of Somerset, N.J. A former analyst in the information systems unit at Sealand Service, Inc. in Edison, N.J., Cairns-Rubin is one of nearly 100 Sealand IS employees whose jobs were transferred overseas last year to be performed by low-cost foreign programmers from offshore firms in the Philippines and India.

After years of working in a largely mainframe Cobol environment at Sealand, Cairns-Rubin is retraining in client/server application development. She has a bachelor's degree in business, a minor in

data processing, 11 years of experience at Sealand and no job. She is seething.

"Corporations are saying they need to do this because this country doesn't have the same skills and experience that [foreign programmers] have," Cairns-Rubin says. "But that's a real phony excuse. Corporations are doing this because they are getting a lot of cheap labor, that's all. Greed is what is driving this whole thing."

The new global economics

Cairns-Rubin is just the tip of the iceberg, a casualty of the new global economics of the Information Age.

A growing number of large corporate end users — including AT&T Corp., Citicorp, General Electric Co., Caterpillar, Inc. and Reebok International Ltd. — are tapping software developers in India and elsewhere, often for 40% to 60% less than the cost of U.S. developers. Exact figures on the amount of programming work being outsourced to contract programmers overseas are hard to come by, but experts such as Howard Rubin of Rubin Systems, Inc. agree it recently has increased dramatically. Rubin Systems, an information technology consulting firm in Pound Ridge, N.Y., conducted a survey of the IT industry in India as part of a worldwide benchmark project.

Typically, experienced Indian programmers make

anywhere from a few thousand dollars per year to about \$10,000 per year. Their counterparts in the U.S. make between \$36,000 and \$48,000 a year, according to *Computerworld's* 1995 salary survey. Wage rates for programmers in Ireland, Russia, the Philippines, Israel, Brazil and elsewhere are also lower than they are in the U.S. (see "Offshore options" on page 104).

"The phenomenon is being driven by the typical drivers: economics and competitiveness," says Jeff Kaplan, an analyst at Meta Group, Inc., a research and consulting firm in Boston. "More and more [U.S.] companies are seeking to out-task as many specific [lower level] functions as they can in order to retain as many strategic functions as they can."

While still a relatively small market at around \$500 million a year, India's software export business is mushrooming — it grew by 115% in 1993 and 61% in 1994, according to the National Association of Software and Service Companies (Nasscom), India's quasi-governmental software industry promotion organization.

And in a survey of Indian IT companies, fully 42% expect India's worldwide market share to grow to two to six times its current size in the next three to five years, according to Rubin Systems.

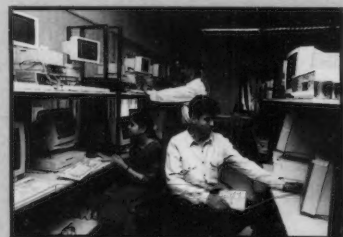
As compelling as the cost savings are, there are other factors fueling the growth in India's software

Meet Naren, hotshot Indian programmer



Ashok Shantha Narendra Kumar, or Naren, as his friends call him, is a 23-year-old programmer working in Bangalore for Infosys Technologies Ltd., one of India's largest software firms. He's pictured here in front of Vidhana Soudha, the state's imposing legislative assembly building.

Western-style informality and openness is infiltrating the stiff, hierarchical management styles that traditionally distanced upper management from frontline staff in Indian companies. Here, Naren shoots the breeze with Infosys' managing director N. R. Narayana Murthy. "The flexibility given to us is unique to this [business]," Naren says.



Naren may be employed by Infosys in Bangalore, but he works for a U.S. company. He is part of a 70-person team involved in a long-term project for a major U.S. corporation. Satellite communications and dedicated links allow Naren to log on directly to the client's computers in the U.S. "The team here is a virtual extension of the U.S. customer," Naren says.

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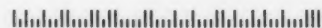
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India

First in a
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industry. India's relative abundance of labor and its rapidly improving communications infrastructure are two important factors. Maturing project management skills and the fairly reliable quality of its programmers also add impetus to the shift of IT business overseas.

And no longer is it just low-level Cobol programming jobs that are crossing the ocean. Increasingly, more of the sexy, high-end stuff like client/server applications, multimedia, object-oriented programming and networking jobs are being exported, observers say. Leading this migration of upstream technology work to India are companies such as Infosys, Wipro Infotech Group, Tata Information Systems Ltd. (TISL), Satyam Computer Services Ltd. and Tata Unisys Ltd. (TUL).

"If somebody can achieve the same quality at a lower cost, why wouldn't everybody beat a path toward their door?" asks Yogendra Singh, vice president of software development at TISL.

Of course, offshore contract programming has its downside. Problems with languages, accents, work culture and the sheer geographic distance add layers of complexity to long-distance relationships.

"The amount of project management that is required and the communication costs often put a dent into savings," says Tim Bourgeois, an analyst at



International Data Corp. in Framingham, Mass.

Still, for many U.S. and European companies, the benefits exceed the costs, and the relationships work reasonably well.

Come for cost, stay for quality

Despite the growth in exports, Indian contract programming firms are quick to claim that they are not displacing IT workers in the U.S.

"Every country competes on its competitive advantage," says N. R. Narayana Murthy, chairman and

managing director at Infosys. "Today, we provide a cost advantage of anywhere [from] 40% to 50% to our American clients. But the real motivation is our ability to mobilize large teams and to provide quality software at [low cost]."

Naren, for instance, is part of a 70-person team handling three separate projects for a U.S.-based multinational corporation. Right now, he and eight others are developing and testing a client/server product based on Unix, C, C++ Motif and X Window System. As part of the project updating process, they keep in touch almost constantly with their U.S. colleagues via electronic mail, telephone and video hookups.

"[The team here] is a virtual extension of the U.S. customer," Naren says. "Although there is a geo-

India, page 102

Pursued and pampered, programmers like Naren and his friends are hot commodities in India. Demand for their skills is increasing dramatically, and employers are pulling out all the stops to lure and retain the best. Apart from an annual salary of about 150,000 rupees (\$4,500), Naren's perks include a stock option plan, low-interest loans, subsidized meals and the potential for overseas travel. The Infosys campus includes a gym and basketball and volleyball courts.



Naren takes a break in the Infosys canteen. There are times, he says, when he and his colleagues work around the clock for two, even three, days at a stretch. For those marathon projects, Infosys provides Naren and his fellow programmers dormitories so they can sleep in the building.

Old traditions coexist with the new in Naren's family. Although he can afford to rent his own place, Naren prefers to live with his family in a rambling old mansion in Bangalore. Until recently, a career in the Indian Administrative Services (IAS) was the ticket to stability and social status. Today, it is a career in computers. "In the past," Naren says, "joining the IAS or becoming a doctor was considered prestigious. Now, it is the turn of software."



Illustrations by Mike Reagan

Offshore Programming

Here Comes India

CONTINUED FROM PAGE 101

graphic separation, there is a conscious effort to have the teams in the U.S. and here work in tandem."

If needed, Naren can switch to an entirely different project, requiring different skills, at very short notice. Before he was assigned to the current project, he was part of a 21-member team developing a warehouse management product on C, Unix and Oracle platforms on a Hewlett-Packard Co. HP 9000 system.

Satellite links, dedicated telephone lines, E-mail, the Internet and videoconferencing hookups give offshore programmers the same kind of access to their customer's hardware as U.S.-based employees. This means that, apart from having a handful of programmers at the customer's site, most of the development work can be done just as easily overseas.

All this communication does not come cheap. Each 64K bit/sec. link has an average annual cost of between \$130,000 and \$140,000. By comparison, domestic leased lines cost about \$9,600 a year. Even though these costs — like most other communications and travel costs — are fully loaded into overall project costs, U.S. companies still find it is often less expensive to outsource to offshore firms.

"It's clear that the savings are significant when you look at the fact that these companies are seeking out and entrusting programming responsibilities to organizations that are halfway around the globe," the Meta Group's Kaplan says.

Infosys typifies the effort and money many Indian companies are putting into wooing foreign business. During the past decade, the company has grown from a start-up operating out of a garage to a 1,000-person, \$12 million organization, with a 125,000-sq.-ft. facility in Bangalore's Electronics City, an export processing zone set up, with government help, on the outskirts of town. Starting with typical maintenance services, porting and patching jobs, the company has moved into high-end, specialized applications for vertical markets such as banking, finance, insurance, transportation, distribution and retailing.

Infosys is ISO-9000 quality certified, which means it has been assessed and found to be in compliance with international quality standards, which are used

Seven by Twenty-Four

In addition to cost and quality, Indian companies are leveraging other advantages, too. One is the 10½-hour time difference between India and the U.S., which allows them to run cost-effective, seven-day-a-week, 24-hour operations.

Consider Satyam Computer Services Ltd., a software export house based in Secunderabad, about 700 kilometers from Bangalore. Every day between the hours of 4:30 p.m. and 7:30 a.m. CST, Satyam provides first-level maintenance and help-desk services for users at Caterpillar, Inc. in Peoria, Ill., more than 7,000 miles and 10 time zones away.

To get help, a user dials an independent service provider in Vienna, Va., which routes the call via Satyam hot lines to Secunderabad. There, engineers dedicated to the Caterpillar project handle technical and business-related problems. Satyam has been constantly tweaking the process with the objective of keeping communication, language and other issues transparent to the end user, according to Rusi Brij, vice president of international marketing at Satyam.

Elaborate backup measures ensure that calls go through quickly. If the hot lines between the U.S. and Satyam's Secunderabad offices are busy or down, the call is rerouted to reach the Indian site.

Problems are resolved over the phone or by logging on to a user's computer from Secunderabad. Every keystroke in that faraway city screams through a LAN, a gateway and a multiplexer to a government-owned satellite earth station about six kilometers away. A communication satellite picks up the signal and beams it down to an earth station in Amsterdam. From there it is blasted along fiber-optic cables under the Atlantic Ocean to Satyam's office in Iselin, N.J. A local circuit carries it to Vienna and on to Caterpillar's facility.

The guaranteed response time for all calls is 20 minutes, and the average time to fix a problem ranges from 90 to 120 minutes.

—Jaikumar Vijayan



Satyam's facility in Secunderabad, India, can link directly to Caterpillar's IS department in Peoria, Ill.

Courtesy of Satyam Computer Services Ltd.

extensively in Europe.

India's Nasscom estimates there are about 95 ISO-9000-certified software companies in India today and 18 companies that have achieved at least a Level 2 in the Software Engineering Institute's (SEI) maturity rating. The highest rating is Level 5. (The SEI rating is a rigorous, U.S. quality standard developed in the 1980s to standardize the software development process.)

Moving upstream

Make no mistake, it's no longer only the low-end legacy system jobs that are migrating to such coun-

tries as India. Work involving relational databases, C++, computer-aided software engineering tools, object-oriented programming, multimedia, networking and some niche market applications are starting to go over the satellite to India. In some cases, U.S. companies are shipping all their development work overseas.

There is a good reason for this migration. Labor is cheap and plentiful. Also, more Indian software companies claim to use rapid application development, object-oriented programming, object-oriented development and project management tool sets than do

India, page 104



Glass and concrete. Far from the sweatshops of popular perception, several of India's software factories boast large campuses and modern facilities. The main building at the Infosys campus has an office area of 125,000 square feet. More than 100 phone lines, 700 PCs, 13 servers, an assortment of midrange systems, two dedicated phone lines to the U.S., two dedicated fax lines and two 64K bit/sec. satellite links connect the facility to the outside world.



Chasing software dreams in India's Silicon Valley. Far from his native Jamshedpur — India's northeastern steel city — Naren is part of a rapidly growing workforce of young software professionals flocking to Bangalore, India's computer capital. Bangalore is home to some of the country's largest domestic computer companies and international corporations, including IBM, Digital Equipment Corp. and Hewlett-Packard Co. "There are enormous opportunities for computer professionals in this city," Naren says.

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Offshore Programming

Here Comes India

CONTINUED FROM PAGE 102

companies in the U.S. or the U.K., according to a worldwide benchmark project conducted by Rubin and Ed Yourdon of Rubin Systems. For example, while 77% of Indian companies surveyed used project management tool sets, only 42% of firms in the U.S. and 54% in the U.K. did.

Consider the following examples of high-end development migration:

- Connectware Corp. is a Richardson, Texas-based subsidiary of AMP, Inc., which manufactures a range of mobile communications software. In addition to outsourcing several of its IT functions, the company shipped the entire development of a new integrated telephony product to Perfect Solutions, Inc., a contract programmer in India.
- Wipro, a \$525 million computer firm in Bangalore, offers a variety of programming services that run the gamut from hardware design and ASICs to networking, communications and operating system support. Among other things, the company has carved out a market for itself by exactly replicating the development labs of its major clients, including AT&T, IBM, Intel Corp., UB Networks, Inc., Novell, Inc., SunSoft, Inc. and Tandem Computers, Inc.
- TISL, a joint venture between IBM and the Tata Group Ltd., one of India's largest business conglomerates, started by doing low-level coding work for IBM labs worldwide. It has since graduated to object-oriented programming, client/server computing, large multimedia applications and full-fledged prod-



Once a genteel pensioner's paradise, Bangalore is now one of India's fastest growing cities. A large public-sector industrial infrastructure, high-quality educational facilities and a good climate have proved irresistible magnets for industry. But the frenetic growth of the past decade has taken its toll. The tree-lined boulevards are choked with vehicles, and the graceful Victorian buildings, such as the High Court building pictured here, are being replaced by modern, multistoried office buildings.

uct development for IBM and its customers. For example, the Bangalore-based company has developed an RS/6000-based application called TIPS (Total Information Planning System) for facilities management that IBM is marketing worldwide.

• Netquest, a young Bangalore-based start-up founded by Pradeep Singh, a former Microsoft Corp. employee, exports global on-line support via CompuServe user forums for one of the world's largest software companies. In less than two years, Netquest has grown from a two-person shop to an organization that employs more than 100 people. Singh has plans to expand to the Internet before the end of this year.

Such growth in quality, high-end software services offered by countries such as India inevitably will have an effect on U.S. programmers, observers say. Programmers like Naren and companies like Infosys are

becoming part and parcel of an international software landscape where borders and boundaries are rendered meaningless by newer and faster communication technologies.





"In the long term, it has to be viewed as a global strategy by multinationals," says Anoop Garg, vice president of systems integration and software exports at Digital India, a partly owned subsidiary of Digital Equipment Corp. "No company can have all [its] resources in one place. It is a question of [using] the global expertise of a company."

And in the U.S., people like Cairns-Rubin will find themselves having to constantly upgrade and renew their skills — or face the prospects of long-term unemployment. ■

Vijayan is *Computerworld's* senior writer for PC hardware.

Offshore options

A growing number of countries offer inexpensive offshore software programming to U.S. companies. Here are the vital statistics on India and three of its competitors.

	Number of software development companies	Number of software engineers	Number of new software graduates every year	Average salary for experienced programmers	Destination of custom software exports	Contacts
BRAZIL 	About 8,000; more than 90% have five or fewer software engineers.	Approximately 64,000; about 50% are in software development, and the other 50% are in sales, customer service and training.	Colleges and universities graduate about 4,500 computer-related professionals a year, and technical institutes graduate another 3,000 a year.	Programmers' annual salaries range from \$15,600 to \$32,500. Systems engineers' salaries range from \$26,000 to \$65,000.	Brazil exports about \$30 million in software, mainly to Latin America.	Softex 2000, a software business consortium. Telephone: (954) 438-6450 (in Florida). Internet address: info@rioosoft.softex.br.
INDIA 	About 300.	About 130,000. Most are in software development.	About 20,000.	Salaries range from a few thousand dollars per year for new graduates to \$10,000 for programmers with five years of experience.	U.S., Europe, Southeast Asia.	National Association of Software and Service Companies, India. Telephone: 91-11-6885474 or 91-11-600121.
IRELAND 	Approximately 500. About 100 are U.S.-based companies and some are European. The rest are Irish, and many are quite small.	Between 12,000 and 13,000.	About 12,000 computer science (or related) graduates per year. The number increases by about 20% per year.	Wages in Ireland vary from about \$19,500 for a university graduate to \$45,000 for someone with five or more years of experience.	At \$4 billion a year, Ireland is the world's second-largest exporter of software, according to the Irish Software Directorate. Most exports go to the U.S. and Europe.	The Irish Trade Board. Telephone: 3531-2695011 (in Ireland); (212) 371-3600 (in New York).
RUSSIA 	Between 100 and 120 small to mid-size companies produce custom software, mainly for bookkeeping and office automation.	From 50,000 to 60,000 programmers. Most work in private companies as software support engineers.	Ranges from 4,000 to 5,000.	Aggregate data is hard to come by, but a program manager in a medium-size company can make about \$12,000 per year.	Data not available.	Alexander Prokin, president of Dator, a Moscow-based research company. Internet address: alex@dator.msk.ru; telephone or fax: 7-095-369-99-16.

Data sources: For Brazil: Eduardo Guy Manuel, president, Sigma DataServ Informatica, an independent IT consulting and project development firm based in Curitiba, Brazil. For India: The National Association of Software and Service Companies, New Delhi. For Ireland: The Irish Software Directorate. For Russia: Dator, a Moscow-based research company and publisher of *Who's Who in [the] Russian Computer Market*. Data compiled by: *Computerworld* and the IDG News Service.

Computer Careers

Successful systems analysts: USER FRIENDLY

*Moving from programmer to systems analyst
requires strong business and people skills*

By Julie Hart

If you're a programmer, take heed. Possessing the latest technical expertise — including object-oriented programming, open systems and the Internet — is no guarantee your career will blossom. In fact, if you want to advance to the rank of systems analyst, technical knowledge alone is apt to work against you.

Instead, in today's client/server environment, employers are promoting programmers who have a polished set of people and business skills.

"The ability to communicate effectively is key," says Amy Resnik, assistant vice president at Pencom Systems, Inc., a recruiting firm in New York. "When we get a job requisition for an analyst, we always look for people who can communicate clearly to any type of person — not just to others in their field."

For some programmers, implementing these interpersonal skills is a major challenge. To make the transition from working alone to being part of an interactive team, programmers can spend time getting to know the people who use their company's computer systems. For example, "go out and find users who are running the system you created," says Peter Borocz, a principal of Capital Markets Technology at BZW Barclays Global Investors in San Francisco. "Simply introduce yourself, and ask them if they have any issues or questions about the system."

Developing your nontechnical skills

SOFT SKILLS

When dealing with your users:

- Listen first. Speak second.
- Balance honesty with tact.
- Write clearly and succinctly.
- Translate technical messages for nontechnical users and management.
- Empathize with users' needs.

BUSINESS SKILLS

Learn more about the company:

- Its products or services
- Company mission statement
- Target customers
- The department's role in company's success
- The competition
- Industry trends and buzzwords

Programmers also will have an easier time gaining critical interpersonal skills if they get to know their company's business. "This will increase confidence when dealing with users and management," Resnik says. "If you have a very strong understanding of your client and what their job is,

you'll become comfortable speaking their language, questioning their goals and offering solutions."

To learn more about your company's business, go to your local junior college and sign up for a class relating to your company's business. Or "ask an analyst if you can go along to some users' meetings," says Doug Morgan, vice president of Toner Corp., a recruiting firm in San Francisco. "As you listen to the users, you'll begin to pick up their lingo, and you'll also see how an analyst interacts with users."

Another idea: Subscribe to the industry-specific periodicals your users read. You can also seek out your company's human resources or marketing department for information about your company's mission and competitors.

The bottom line when using your newfound people and business skills is to "remember that it's the stockholders that have a real stake in what you're doing," Morgan says. "If you always keep that in mind, you'll do much better analytic work — and have a more successful career as a systems analyst."

Hart is a freelance writer in Mercer, Calif.

RESOURCES

To develop people skills:

- Your manager
- Training seminars
- Networking with others in your field via user groups, on-line chat rooms and conferences

To develop business skills:

- Your company's annual report, sales manual, company background or other documents
- Industry-specific courses (i.e., Accounting 101, Marketing 101)
- Co-workers in the department you develop systems for

The lure of vendors

*With the right skills and mind-set, you can find more money and freedom
with vendor companies. But there are trade-offs.*

By Alan Radding

For some information systems professionals, the grass is indeed greener on the other side of the fence. For those with the right technical skills, a marketing mind-set and a willingness to travel, the vendor side of the business can look very tempting. Benefits can include higher pay, a more supportive technology culture and the opportunity to have a real bottom-line impact. But it isn't the right career move for everyone.

Going from an end-user to a vendor organization isn't typical, says Mary Kay Hamm, a principal at Linden International in Wayne, Pa. It represents "a clear career choice. You're looking for different types of things," she says.

For example, those making the move can become specialized in a particular product or technology. This may limit some career options down the road but open others, such as consulting. On the other hand, for people who want to be pure techies, "it is a lot easier to be a techie in a vendor organization," Hamm says.

A short stint at Fidelity Management Co. convinced Sid Patel that life as a systems engineer in a large end-user organization wasn't for him. The problem: the layers of management. "You have an idea for something about the system, but you have to sell it through so many layers. I

am just too impatient," Patel says.

Today, working on problems as a systems consultant at Pyramid Technology Corp., Patel has much more freedom to act. "If I see something, I can fix it," he says.

Vendors want people who can design, build and deliver products profitably, says Lee Silver, president of executive recruiting firm L. A. Silver Associates, Inc. in Framingham, Mass.

"They're looking for people who know how to get the product development job done," Silver says. These people will manage 150 to 300 software development engineers. The successful candidates "can't be bits and bytes people who want to write code. They must have technical development skills," he says.

For less specialized technical support, vendors may look more favorably on end-user candidates. These positions generally have a title of support engineer or technical marketing specialist and are responsible for pre- and post-sale technical support.

While technical skills are important in these positions, pure techies needn't apply. "The vendors want people who are presentable to clients and prospects," Hamm advises. That means someone who is outgoing, can handle himself socially and pro-

jects a feeling of credibility and trustworthiness.

Radding is a freelance writer in Newton, Mass.

Advantages and disadvantages of working for a vendor

ADVANTAGES

- Supportive technical culture
- Freedom to be a pure techie
- More input as a technical person
- Better compensation
- Opportunity to develop highly specialized skills
- Direct involvement in the core business and profitability of the company

DISADVANTAGES

- Frequent travel
- Participation in selling
- More limited career track
- Requires high-demand technical skills

Successful candidates

*"can't be bits and bytes
people who want to
write code. They must
have technical develop-
ment skills so they don't
get the wool pulled over
their eyes... people who
know how to get the
product development job
done."*

— Lee Silver, president,
L. A. Silver Associates

Software Design Engineer Designs, develops, and modifies analytical software and software tools to be used to create a Graphic User Interface and processes of displaying data from scientific instruments to allow end users and efficiency of analyzing data which is transmitted by such scientific instruments. Uses principles of Digital Signal Processing to assure software is capable of receipt of data, manipulation and analysis of numerical and scientific information, and the reconfiguration of such data for display in a scientific manner. Uses C++, Pascal, MFC, Borland OWL and Delphi VCL to develop object-oriented programs to perform appropriate simulations, numerical analyses, and graphical presentations. Requires M.S. or completion of all coursework for M.S. degree. Software Engineering or Electrical and Computer Engineering. Also requires six months experience in the job to be performed or six months experience as a Computer Engineer. Education to include completion of one year research in object-oriented programs using C++ to develop simulations, numerical analyses, and graphical presentations. If experience in related field, entire experience must include development of data and signal processing software tools and design of a Graphic User Interface to allow end user to monitor and test communications equipment using C++, Pascal, MFC, Borland OWL and Delphi VCL. Hours: 7:45 a.m. - 4:15 p.m. 40 hours per week at \$42,000 per year salary. Must have proof of legal authority to work permanently in the U.S. Please send resume to Nancy Young, Human Resource Manager, Erickson Instrument Company, 2200 Warrenville Road, Downers Grove, Illinois 60515. No Calls.

Software Engineer Creates and develops various data structures to analyze information management systems for purposes of performing database conversion on multi-platforms including mainframe, to a UNIX and Sysbase environment of pension and benefits for a financial institution and/or financial benefits analysis company. Will use Sysbase and C++ in a UNIX environment including using SQL for file validation purposes. Will write stored procedures to insure database quality assurance and data acquisition flow in a network environment. Will perform appropriate database management software system integration by using Object-Oriented programming or Object Query language tools. Requires Bachelor's degree in Computer Science. Also requires three years experience in the job to be performed or three years experience as a Software Engineer. If experience in related field, entire experience must be in the design and development of software applications for a financial institution for financial benefits analysis company using C and SQL in a UNIX environment. Hours: 9:00 a.m. - 5:00 p.m. 40 hours per week at \$44,000 per year salary. Must have proof of legal authority to work permanently in the U.S. Please send resume to Toni Marie Plumb, Human Resource Manager, UO Solutions, Inc., 2211 South York Road, Suite 310, Oak Brook, Illinois 60521.

Software Engineer to analyze complex Electronic Publishing, Document Delivery Systems & Networks, design, develop & implement hardware, system software, data communication systems & Networks (LAN/WAN), design & develop application software, API's, communication software & development tools using networking protocols (X.25, TCP/IP), C++, assembly language under Unix, Windows & Novell environment on IBM, SEQUENT & STE platforms, Regs. Bach. in Comp. Sci., Computer, Electrical or Electronic Engg., Comp. Info. Systems or foreign equiv. 2 yrs exp in job offered or 2 yrs related exp such as Consultant or Software Engineer. Related exp must include Networking Protocols (X.25, X.3, X.4, Frame Relay), Real-time Kernels & Executives for STBus based hardware & microprocessor based Embedded Systems. Must have exp in developing & implementing API & application software device drivers for Data Communication using network protocols on Unix platform using C++ assembly language. \$50,000/yr. 40 hrs/wk 8a-5p. Send resume to 7310 Woodward Ave., Room 415, Detroit, MI 48202. Ref. #17996 'Employer Paid Ad'

Sr. Programmer Analyst (2 positions) to consult with clients to ascertain & define their business requirements or problem areas & utilize technical expertise to provide solutions to client needs; analyze, design & develop computer software for clients; EDP systems; analyze, design & develop client server based, integrated software related to insurance business; interact with user in identifying reporting facilities; design of mainframe databases (DB2/CICS), database design with Microsoft SQL Server 4.21, VB 3.0 Front Ends, master's degree or its equivalent required in Computers or Engineering, plus 1 year experience in the job duties described above. University work experiences (other than mere classroom study) may be used to satisfy the experience requirements. Must have proof of legal authority to work in the U.S. Salary - \$42,800/year for 2-40 hour work week. Apply at the Texas Employment Commission, Dallas, Texas, or send resume to the Texas Employment Commission, TEC Building, Austin, Texas 78778-0001, O.O. Number TX7504639. Ad paid by an Equal Opportunity Employer.

Consultant to develop real time systems applications in client/server UNIX & Novell (DOS) environments with knowledge in EER (Enhanced Entity Relationship) Conceptual Modeling, Object-Oriented Database Design, GUI Design, X-Windows/Motif 1.2 & PowerBuilder 4.0, develop applications in X-Windows/Motif on UNIX platform & in PowerBuilder on Novell (DOS) platform. Regs. Master's in Comp. Sci., Comp. Info. Systems or Electrical Engg. 6 mos exp in job offered or 6 mos related exp such as Software Developer, Lab Administrator or Intern. Must have related exp in client server environment on UNIX using C, C++, GUI Design, X-Windows/Motif Graphics & grad. level courses, 1 each in: System Analysis & Design I (object oriented modeling & Analysis & Design), GUI Design, Object Oriented Programming in C++, System Analysis & Design I. \$44,000/yr. 40 hrs/wk 8a-5p. Send resume to 7310 Woodward Ave., Room 415, Detroit, MI 48202. Ref. #28596 'Employer Paid Ad'

Computer Systems-Analyst. Analyzing customer requirements to assist in the development of automatic document processing systems on the Unisys DPS500, S4000, C40 & B20 Series computer hardware using EPLX, CTOS Pascal, Clipper & C++ computer languages; assisting customer with maintenance of the system M-F: 40hrs, overtime varies: 9-5; \$42,000/yr. Requirements: Bachelor of Science Degree in computer science, electrical engineer, or control and computer engineer, two year's experience in the job offered. Special requirements: at least one year's work experience with each of the following: automatic document processing systems, Unisys S4000, S40, & B20 Series computer hardware; EPLX, CTOS Pascal & Clipper computer languages. Must have proof of legal authority to work permanently in the U.S. Send 2 copies of both resume & cover letter to: Illinois Department of Employment Security 401 S. State St. 3 South Chicago, IL 60605. Attn: James Cagley. Ref. #13874-2. No calls. An employer paid ad.

Sys Eng. build/program/sup Novell Netware LAN's, build/support IBM OS/2 MS Windows for Workgroups & MS Windows NT networks, install/program TCP/IP, DCL, FIP, NFS, REXX & client clients & servers, install program connectivity to HP/UNIX servers, GM network & internet, install/support network mgmt & reporting tools like NetXtend, Novell LANManager, UT Auditor, Bindview, SiteMeter, PowerChute & AHCServer, new releases of ED's LAN Enterprise Order Management applic. test/consult on s/w, file components w/ED's Inter-Operability Lab file MS-comp. s/w. 2yr exp as a network mgmt installing installation of Novell Netware 3.11 LAN, EIS, mgmt of office automation using IBM 40hr/wk, 8-5pm, \$8800/wk. Employer paid ad. Send resumes to 7310 Woodward Ave. Rm 415, Detroit, MI 48202. Ref. no. 23096.

SOFTWARE ENGINEER required. Develop Client/Server Application framework for Scientific Data Acquisition & Cross-Platform GUI tools. Design commercial systems & construct debugging utilities using expertise with language compilers, parsers, run-time interpreters & distributed processing. Software development using C/C++, Visual Basic, API functions & Windows Development Toolkit. Also perform extensive work with Dynamic Data Exchange (DDE) files & internal Windows component level communication protocols. Master's degree or its equivalent required in Computers or Engineering, plus 1 year experience in the job duties described above. University work experiences (other than mere classroom study) may be used to satisfy the experience requirements. Must have proof of legal authority to work in the U.S. Salary - \$42,800/year for 2-40 hour work week. Apply at the Texas Employment Commission, Dallas, Texas, or send resume to the Texas Employment Commission, TEC Building, Austin, Texas 78778-0001, O.O. Number TX7504639. Ad paid by an Equal Opportunity Employer.

Systems Analyst to analyze, design & develop Management Information System requirements. Financial Accounting System & Health Care System on UNIX platform & IBM mainframe using Relational Database running under UNIX O.S. & using INFORMIX 4GL, Triggers & Procedures. Also on DOS/VSSE using COBOL & REXX. Regs. Master's in Comp. Sci., Comp. Engg., Comp. Applications or its equiv., 2 yrs exp in job offered or 2 yrs related exp such as Sr. Systems Engineer, Systems Coordinator, Project Leader or Systems Analyst. Related exp must include design, development & implementation of MIS, Production Planning & Control System on IBM-4361, Micro Computer hardware using relational databases like ORACLE, SQL/DS, INFORMIX & REXX, FORTRAN, ESOL/COBOL as well as UNIX, DOS/VSSE & VMSP O.S. \$50,000/yr. 40 hrs/wk 8a-5p. Send resume to 7310 Woodward Ave., Room 415, Detroit, MI 48202. Ref. #21496 'Employer Paid Ad'

Programmer Analyst to analyze, design & develop business applications; PC software development using CA-CLIPPER; Data General mainframe software development using PowerHouse & COBOL; maintain PC software (Encounter, RIMS systems) & solve problems for users; & install PC software for clients; Regs. Bach. in Comp. Sci. or equiv., 2 yrs exp in job offered or 2 yrs related exp such as Computer Programmer &/or Software Programmer. Related exp must include developing, maintaining & analyzing computer software. Must have exp using COBOL, DCL, CA-CLIPPER, AOS/VS, PowerHouse, TurboImage, Query 3000, Superlot & HP 3000; \$17,500/hr. 40 hrs/wk 8:00a-5:30p. Send resume to 7310 Woodward Ave., Room 415, Detroit, MI 48202. Ref. #29596 'Employer Paid Ad'

Software Engineer, 40hrs/wk, 8-5, \$40,000/yr. Transport network data using electronic data interface/data link on UNIX & TCP/IP networks under digital loop environments. Write interactive graphical PowerBuilder scripts & Sysbase DML/SQL stored procedures to perform visual parallel queries. Test, develop, & implement Powerman/OMS applications, GUI design. Min reqs: MS in MIS or Computer Science, 1 yr in carrying out those duties set forth in the offered or 1 yr in system design in DML/SQL, in using stored procedures with MultiDB electronic data/data interface on UNIX & TCP/IP networks, in designing GUI's. Past use of PowerBuilder to design a Window interface. Apply at the Texas Employment Commission, Fort Worth, Texas, or send resume to the Texas Employment Commission, TEC Building, Austin, Texas 78778, O.O. #TX7504283. Ad Paid by an Equal Opportunity Employer.

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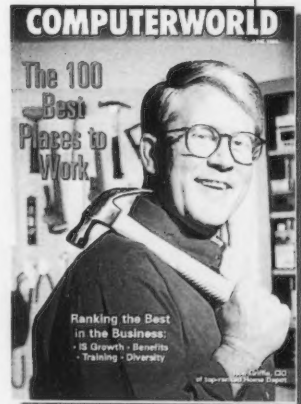
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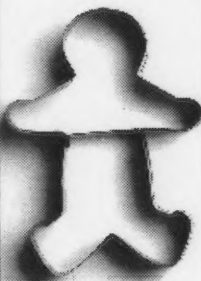


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Decision Support Systems and Executive Information Systems Project Leader

Seeking an individual to manage the implementation of Executive Information Systems, Decision Support Systems and Data Warehouse Projects. Familiarity with UNIX, Windows NT, relational databases, multi-dimensional OLAP databases and GUI application development tools (PowerBuilder, Powerplay or Imprimus) is preferred. Position will involve defining technical requirements of hospital executives and top management and developing technical specifications. This individual will be responsible for managing a project team of system analysts and programmers. Graduate level education is preferred. #00000001

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NT Systems Administrator

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and provide support to Client Departments' Local Area Networks. This individual must have proven experience in a Windows NT Server environment and have extensive knowledge in supporting complex, networked windows PCs. Novell LAN management, Microsoft SMS and Macintosh support experience also desirable. #00002948

Clinical Systems Support Lead

Seeking an individual to work with a multi-disciplinary team to manage system support for a number of clinical applications such as Radiology, Pharmacy, Pathology, and Labs in an open system environment. Proven system analysis experience in UNIX, VMS, and relational databases required. This individual will be comfortable working as a liaison with hospital clients in various clinical departments and in supervising a programming team. #00000565

Software Applications Programmer

This is an applications programmer position working with the clinical information systems at the Western Psychiatric Institute and Clinic. The qualified applicants will program and maintain on-line screens, batch programs, and ad-hoc reports. This position also maintains additional clinical systems (Pharmacy, Laboratory, Medical Records). A bachelor's degree in computer science or related field is required. A master's degree is preferred. Prior work experience in a health care setting is also desired.

The following technical experience is also required:

Relational database concepts, preferably Sybase, SQL, Programming in a fourth generation language, preferably Unity Acel, UNIX skills, Personal Computer skills. #00002912

System Engineer - Hospital Services

Seeking an individual to work with a multi-disciplinary team to establish an integrated order management system in conjunction with development of an integrated electronic health record. Proven systems analysis and programming experience required and previous experience in clinical systems development preferred. #00000003

System Engineer - Custom Application Development

Seeking an individual to work with a multi-disciplinary team to develop custom applications in support of a wide variety of end user requirements. Proven systems analysis and programming experience required, B.S. in Computer Science preferred. Previous experience with object oriented methodologies, GUI application development tools (PowerBuilder, Microsoft Access, Visual Basic), relational databases preferred. #00002896

Please submit resumes, referencing the corresponding position #(s) to: UPHC, 200 Lothrop Street, Pittsburgh, PA 15213, Attention: TJB, EOE

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As part of the Information Services department, the Messaging Team is responsible for delivering PC-based communication tools to Quaker's 6,000+ user community. As a member of this team, you will provide 2nd level support for Quaker's messaging environment. Excellent problem-solving skills, strong interpersonal skills, a passion for customer service and a commitment to keeping a mission critical system up and running are essential.

The qualified candidate must possess 4+ years business and technical experience and 2+ years experience implementing and supporting corporate PC-based electronic mail systems. The individual must have the ability to lead projects and teams to successful implementations. Microsoft Mail, Schedule+, MTA, directory synchronization, and Novell Netware experience is strongly desired. Experience with X-400, Internet, Visual Basic, MAP and Microsoft Mail certification are a plus. (Job Code: MT)

DESKTOP PLANNING AND SUPPORT TEAM

As part of the Information Services department, the Desktop Planning & Support team is responsible for delivering PC-based productivity tools to Quaker's 6,000+ user community. As a member of this team, you will provide 2nd level support for Quaker's PC application environment - primarily Windows, Word and support at the Executive level. Excellent problem-solving skills, interpersonal skills, a passion for customer service, and a commitment to keeping PC users productive are signatures of successful team members.

The qualified candidate must possess 6+ years business and technical experience installing and supporting PC-based applications in the Microsoft Windows environment with Microsoft certification a strong desirable. The individual must have the ability to lead multiple, simultaneous projects and teams to successful implementations. Expertise in Visual Basic or other high level procedural language is required. Novell Netware experience is strongly desired. (Job Code: DP)

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QUAKER

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Analyst III

You will be responsible for analyzing requirements, designing applications and the construction of applications. Qualifications include 5 years of analysis/development experience and good communication and problem solving skills. Experience should include COBOL, SQL, PowerBuilder, Oracle SQL, Forms and experience in Manufacturing, Warehousing and Logistics systems. Knowledge of IEF, C, C++, UNIX and Visual Basic are pluses. A BS is preferred. Job Code: A3

Sr. Specialist System Administrator

We will rely on you for day-to-day UNIX and NT system administration and technical architecture migration planning and implementation. You will need a BS and skill in many of the following areas: UNIX, NT system administration, C++, NFS, DNS, TCP/IP, RPC, Perl, SCCA, Inake, KSH, CSH, SCCS, RCS, PGP, sendmail, and RDBMS experience. Project planning, mentoring skills and UNIX security experience desirable. Job Code: SSA

Sr. Specialist System Management

This position will be responsible for the establishment and management of open systems system management environments and technical architecture migration planning and implementation. You will need a BS and skill in many of the following areas: UNIX, NT system administration, optical storage, UNIX security, schedulers, disaster recovery, tape and print management, C, Perl, NFS, TCP/IP, NFS, DNS, KSH, CSH, PGP, general RDBMS and SNA/IBM development. OO skills a plus. Job Code: SSM

Optimization System Analyst Fruit Procurement

This position is responsible for the management of the Procurement Department's seasonal planning and harvest optimization system. Qualifications include a BS in Statistics, Business or Quantitative Science and 2-5 years of experience in business applications. Experience in computer applications for optimization modeling/statistical process control a plus. Job Code: OSA

Project Manager

You will be responsible for identifying and developing business systems and information solutions for both strategic and business problems. We require 4-6 years of experience as a systems project leader managing supply chain application system implementation or 3-5 years of experience with a major supply chain software vendor. Consulting experience a plus. The ideal candidate will have skills in systems development life cycle, working knowledge or reengineering concepts, and proven project management experience. We are looking for process manufacturing experience in a large company environment. A BS degree is required. MBA highly desired. Job Code: PM

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Database Analyst: Will develop, design, enhance, and support the company's applications for a real-time global financial trading system using a Sybase relational database. Will develop appropriate Graphic User Interfaces, create database management, design packages, and write old software applications for enhancement purposes to allow end users to access separate Sybase relational database systems on a worldwide basis. Will code processed data to create image files and data files. Work will be performed on both SUN and NeXT workstations in a UNIX environment in which the individual will use C++, C, SunView, and X-Window-Motif to implement database software. Requires Master's degree in Computer Science. Also requires one year experience in the job to be performed or one year experience as a Research Assistant. If experience in related field, entire experience must be in the development and analysis of global database systems which uses a Sybase relational database on a Sun workstation in a UNIX operating system using C++. Education to include completion of one project in which the individual designed a relational database on a NeXT workstation. Education to include completion of one project in which the individual coded processed data to create image files and data files. Hours: 9:00 a.m. - 5:00 p.m. 40 hours per week at \$45,000 per year salary. Must have proof of legal authority to work permanently in the U.S. Please send resume to: Illinois Department of Employment Security, 401 South State Street - 3 South, Chicago, Illinois 60605. Attention: Joan S. Siskin. Reference #V-IL 14181-S. An Employer Paid Ad. No Calls - Send 2 copies of both resume and cover letter.

System Software Engineer: Designs, develops, and modifies software systems to develop customized software application packages for use in the insurance industry under MS Windows, Windows 95, and Windows NT using Visual Basic, Visual C++, and Database Engine techniques. Designs and develops software products for use by insurance agents to illustrate various insurance products by developing appropriate graphic user interface using Visual Basic and ODBC to be used in a MS Windows platform to access relational databases including MS Access and Paradox. Insures that such software is capable of customizing reports, charts, and graphics to illustrate insurance products for presentation before customers. Will develop other ancillary customized software based upon various relational databases which will allow insurance agents to access various insurance data including contract management information database and scheduling features as well as insures that various modules are properly integrated with the entire product and reprograms the programs to accept modification and access to relational databases. Requires Master's degree in Computer Science. Education to include completion of a Master's thesis in the design and development of an MS Access or Paradox relational database in a Windows NT and Windows 95 environment in which the individual used Visual Basic and ODBC. Visual C++ and Database Engine techniques to create customized graphic user interfaces for contract management. Education to include completion of one course in each of the following: Information Retrieval; Object-Oriented Design and Programming; and Computer Communication Network. Hours: 9:00 a.m. - 5:00 p.m. 40 hours per week at \$39,500 per year salary. Must have proof of legal authority to work permanently in the U.S. Please send resume to: Chuck Zachow, Manager, Administration, FINSICO Inc., 1090 Executive Way, Des Plaines, Illinois 60018. No Calls.

Software Engineer to consult with clients, analyze system requirement & carry out business area analysis; design databases to conform with Relational Methodology, develop Entity-Relationship model for implementation in client/server environment; install Oracle 7 RDBMS or UNIX, LAN, VAX/VMS servers; carry out database administration, install, test & evaluate database monitoring software DB-VISION, PATROL, ECOTOOLS & develop methodology for monitoring multiple databases; develop Korn & C Shell scripts for UNIX systems & DCL scripts for VAX/VMS systems; analyze legacy systems running on Mainframes like VAX/VMS & convert onto client server environment; design & develop applications using relational tools & interface with PC level software such as MS EXCEL & MS ACCESS; Regs. Master's in Comp. Sci., Comp. Engg. or Comp. Info. Systems, 2 yrs exp in job offered or 2 yrs related exp such as Consultant, Oracle Database Administrator, Software Analyst or Systems Assistant. Related exp. must include analyzing & designing applications & databases, designing & developing FORMS & REPORTS using Oracle Forms 4.0 & Oracle Reports 2.0, monitoring & tuning database & performing database administration activities. Must have exp. using Oracle 7.1, Informix, SQL*Plus, PRO/C, UNIX & training users; \$57,000/yr. 40 hrs/wk 8a-5p. Send resume to 7310 Woodward Ave., Room 415, Detroit, MI 48202. Ref. #18195 'Employer Paid Ad'

SW Eng. perform s/w development including requirement analysis, design, prototyping, implementation & testing using object-oriented technology; perform system programming using shell script & C; develop & conduct UNIX shell programming & UNIX network programming using TCP, IP, RPC, & sockets; responsible for s/w & h/w troubleshooting. Req. MS in computer sci. 5mon exp involving object-oriented design methodology, Motif & RPC. 1.5yr in using X-Motif, designing network using IP, Socket, Interface & ClearCase. 40hr/wk. 8-5pm. \$45,000/yr. Employer paid ad. Send resumes to 7310 Woodward Ave. Rm 415, Detroit, MI 48202. Ref No 30296

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Senior Software Engineer

Extensive exp. with VMM devices/drivers & development of VxDs, DLLs, TSRs. Good knowledge of PC bus (ISA, PCI) architecture, digital interfaces, PC I/O hardware/software protocol & interfaces.

Sr. Software Analyst/Programmer

Good understanding of PC LAN I/O (sockets, ports, datagrams, sessions, packets) & internetworking of IPX, TCP/IP, & ATM protocols. Integration & development of PC I/O interfaces/drivers for ISDN, V.34, RS422/RS485, DirectPC.

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Extensive experience in DBMS software development for multi-user Windows applications. Integrate & develop software for dBase file access/update from C/C++ for real-time concurrent information acquisition/distribution systems.

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CODE: LH/SEII-CW

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These positions provide operating system technical assistance and consulting to RIS development and support staff. You will develop and maintain operating system architecture standards, and application standards related to use of system locales. Experience with client/server and distributed systems management and background as a systems software engineer in a UNIX or VMS environment required. Job Code/SEE

Data Base Administrator

This position provides data management technical assistance and consulting to RIS development and support staff. You will also develop and maintain the APC Data Architecture, including business and engineering applications, shop floor applications and data warehouse. Interacting with development staff to design and configure data bases for new applications also involved. Experience as a DBA in an Oracle environment, and background with client/server systems and distributed data bases required. We prefer UNIX and object-oriented data management experience. Job Code DBA

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This position provides technical assistance and consulting in CAD/CAM/CAE/CIM to Engineering and RIS staffs. You will also develop and maintain hardware/software configuration standards and work with customers and support staff to diagnose and repair operational failures. Experience in supporting Engineering systems in an HP/UX environment and a background with Unigraphics, Catia, PDS, SDRC or Autocad required. Job Code/ESS

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Programmer Analyst (2 openings) to consult with clients to ascertain & define their business requirements or problem areas & utilize technical expertise to provide solutions to client needs; analyze, design & develop computer software for clients EDP systems; develop distributed networking insurance information system on multiprocessor (IBM 3090, PC-LAN, OS/2 & UNIX) in which client system builds the query & route to an appropriate server through X.400, LU6.2, LAN to Unix, IBM 3090, OS/2 & receives response while server module polls line for the query & responds to client with appropriate data; design, develop & implement system which meets user specification/requirement of various communication protocol modules which runs on IBM 3090, Unix, PC-LAN server & PC client; Regs. Bach. in Comp. Sci., Electrical, Electronic or Computer Engg., Systems Analysis, Comp. Info. Systems, Math or foreign equiv., 2 yrs exp in job offered or 2 yrs related exp such as Systems Analyst, Programmer, Software Engineer, Consultant or Project Leader. Must have some related exp including implementing IEEE 802.2, ISO & CCITT recommendations & designing & developing using X.400, LAN, C, IBM 3090, X.25 & OS/2; \$53,800/yr. 40 hrs/wk 8a-5p. Send resume to 7310 Woodward Ave., Room 415, Detroit, MI 48202. Ref. #23696 "Employer Paid Ad"

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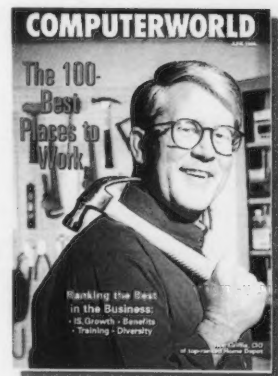
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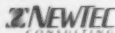
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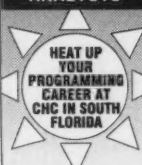


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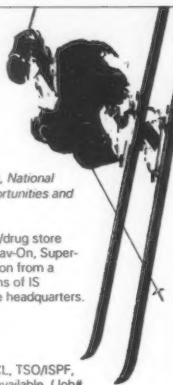


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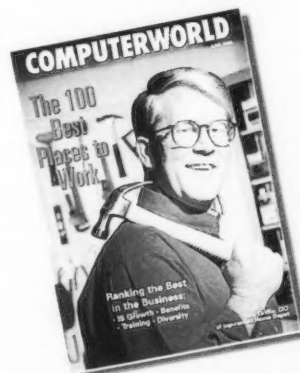
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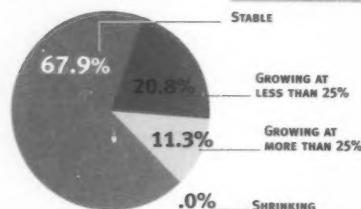
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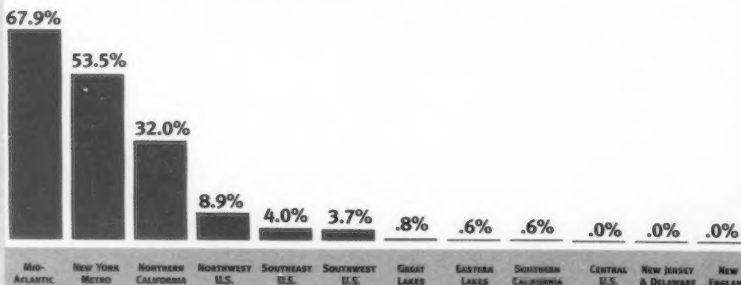


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CORPTECH, A DIRECTORY PUBLISHER IN WOBURN, MASS., TRACKS THE U.S. 35,000 TECHNOLOGY MANUFACTURERS. THIS SURVEY RELATES TO THE 29,383 TRACKED FIRMS WITH FEWER THAN 1,000 EMPLOYEES.

Shopping for a systems integrator

Peers can point buyers in the right direction. Then it's time to talk money.

BY ALAN RADDING

Finding the right systems integrator — a one-person shop, specialized boutique or giant, international firm — is a mix of art and process.

Computerworld spoke with two experts who offer advice about how to select a systems integrator: Gene Bledsoe, managing partner at Casal Group in Dallas, and Jeffrey Geibel, managing partner at Geibel Marketing Consulting in Belmont, Mass.

CW: Where do you start looking for the best systems integration deal?

Bledsoe: Systems integrators segment themselves by market, technology, product or skill set. Your best bet is to find one by word-of-mouth — someone who has done similar work successfully for someone else. You can spend a lot of time interviewing different systems integrators, but that involves a lot of wasted effort. Try to find referrals.

Geibel: Start by defining your specific area of need such as manufacturing systems or workflow or whatever. Identify the leading software brands in that area, and have a sense of the size and scope of your project such as the number of seats or servers. Call the software vendors for a list of integrators who are qualified in their technology. Just because they are on the vendor's list, however, is no assurance of [the integrators'] competency. You'll have to investigate them.

Preparation checklist

- ✓ Focus on the business problem, scope and scale
- ✓ Interview references extensively
- ✓ Develop detailed partnership specifications with the integrator at the outset
- ✓ Review bids for missing elements or padding
- ✓ Evaluate bids relative to the business value of the project
- ✓ Insist on experienced project management to control budget overruns
- ✓ Establish a procedure for early problem identification and resolution

CW: How do you choose among several systems integrators?

Geibel: Start by contacting likely candidates from the lists provided by the software vendors. Give some specifics about your project, such as size and scope, but not about your budget. Request a letter of interest that should include [the candidates'] capabilities and experience and three reference accounts. Listen to see if they are simply order-takers or if they bring greater value based on their experience. Do they help you anticipate issues?

CW: What can you expect from references?

Bledsoe: For projects that involve a major amount of money, consider visiting the reference site. In a site visit, you spend more time with the reference than you do over the phone so you can get beyond the initial vendor line. You meet more people who are involved with different aspects of the project,

people who may have different feelings about the integrator.

Geibel: Find out from the reference what work was done by the company and what work was done by the integrator. Because these are references provided by the integrator, you won't hear about problems directly. You'll have to ask questions about every aspect of the project and read between the lines as you probe to see where problems arose or where things should have been done differently.

CW: How do you evaluate the price?

Bledsoe: Price is extraordinarily relative. Remember, you are trying to solve a business problem — buying something that will make you more efficient and productive. The price can be evaluated only in terms of your overall business return on investment. An \$85-per-hour [deal] that provides you with a better system sooner may be a better deal in the long run than a \$65-per-hour

[deal]. It is unlikely you will get fixed-price bids, and no one will guarantee that there won't be cost overruns.

Geibel: You want to end up with three quotes that are itemized for hardware, software, consulting, project management, training and maintenance. If the gap between the highest and lowest is 15% to 20%, that's normal. If there is a wider gap, the low bidder probably is leaving something out or the high bidder is padding the job. Training should be an optional cost. Maintenance usually runs about 15% of the cost of the job, but that will vary depending on the level of support you need.

CW: How can you control cost overruns?

Bledsoe: You can minimize the chance of cost overruns by working with the integrator to develop comprehensive project specifications from the start. Everybody knows what steps are involved, what the deliverables will be and when they are expected. This is such a critical step that it is often worthwhile to pay the prospective integrator to develop such a specification at the outset. If you are uneasy about what the integrator is suggesting or you aren't getting the right answers at that point, say good-bye. ■

Radding is a freelance writer in Newton, Mass.



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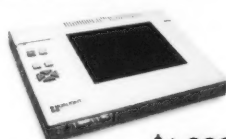
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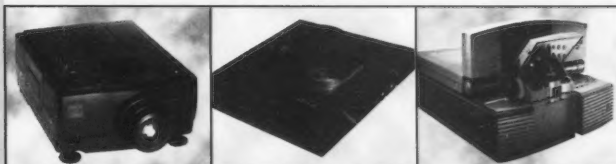
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Currently, the City enters into requirement contracts for information technology commodities with an estimated term usage of between \$30 and \$43 million. While keeping within applicable statutory and regulatory parameters, the City would like to investigate the potential flexibility gained from this type of outsourcing. Therefore, the City is soliciting comment from the private and public sectors for any information on this topic. Please respond if your company has been or is currently involved as a purchasing service or if you are a business entity or government agency which is currently outsourcing this technology procurement function.

If you are interested in responding to the Request For Information (RFI), please contact Helene Heller of the Mayor's Office of Operations at (212) 788-1412 with your FAX number, mailing address and/or Internet e-mail address, for a copy of the RFI questions and further information.

The City will be accepting information on the above until March 15, 1996, close of business.

Public Notice

Southwestern Bell has filed an application with the Public Utility Commission of Texas (PUC) to offer a new service called Positive ID. Positive ID enables customers to specify the incoming calls that can access their computer telephone numbers. Calls from telephone numbers that have been authorized for acceptance and/or from callers who have been given an access code will be accepted.

This application is proposed to become effective on April 1, 1996. The service will be offered state-wide on a staggered basis, through 1997, where facilities permit. The service is scheduled to be first available in the Austin metropolitan exchange with availability in Dallas/Fort Worth, Houston, and San Antonio to follow within six months.

Specific questions regarding the service, and its availability, should be directed to the Southwestern Bell Business Office.

Persons who wish to comment on this application should notify the Commission as soon as possible. Requests for further information should be mailed to the Public Utility Commission of Texas, 7800 Shoal Creek Blvd., Austin, Texas 78757, or you may call the Public Utility Commission Public Information Office at 512-458-0256, or 512-458-0221, teletypewriter for the deaf.

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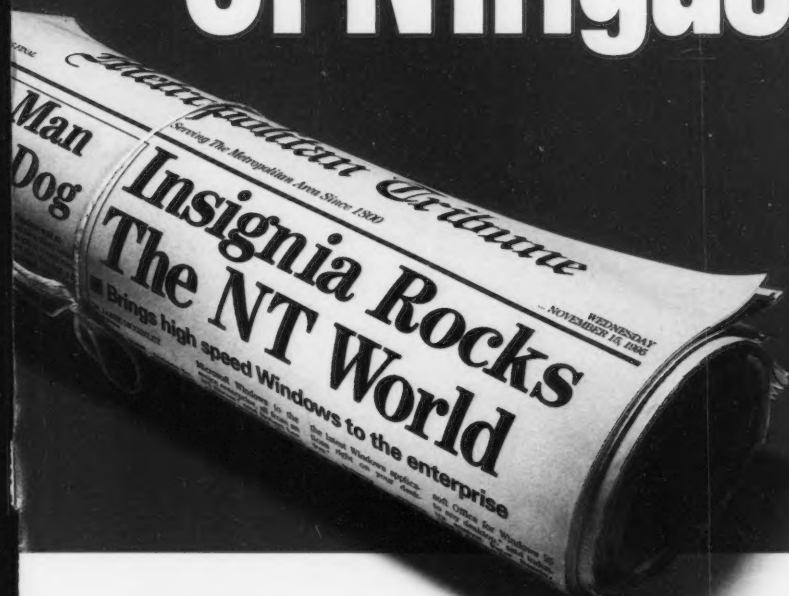
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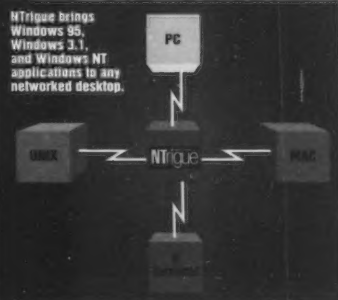
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Chip stocks: Finding solid investments in a down market, 122

Finance & Investing

Ready to RBOC and roll?

Investing in the telephone company is no longer for your grandmother

By Neal Weinberg

Those wonderful days of yesteryear, when holding stock in the regional Bell operating companies (RBOC) meant a guaranteed rate of return and steady dividend checks, are over.

Welcome to the wild and woolly world of telecommunications deregulation, in which feisty RBOCs attack the lucrative long-distance market while opening their local fieldoms to invading interexchange carriers and cable operators.

RBOC stocks had a sterling year, as Wall Street bid them up in anticipation of deregulation, according to Connie Luecke, an analyst at Duff & Phelps, Inc. in Chicago. But RBOC stocks will be a mixed bag this year, and it will be a good two years before clear winners and losers emerge from the fray, she adds.

To pick likely winners, investors should watch for companies that demonstrate marketing acumen, are able to generate name recognition and can deliver innovative new services to market, Luecke says. She recommends Ameritech Corp., BellSouth Corp. and Nynex Corp.

While Luecke predicts mixed results, other analysts are bullish on all seven Baby Bells.

"RBOCs — with a large part of a long-distance network already built, with a customer base and franchise already established, and with four long-distance networks to buy from — are sitting pretty," says Daniel Reingold, first vice president at Merrill Lynch & Co. in New York.

In fact, Reingold puts Ameritech at the top of his long-term buy list, predicting earnings per share of \$3.75 in 1996, compared with \$3.40 in 1995. The company, which recently raised its quarterly dividend by 6%, has top-notch management, has successfully cut its costs and is well positioned to enter the long-distance market, he says.

But Jack B. Grubman, group leader for the Salomon Brothers, Inc. Global Telecom Team, takes a bearish view.

"We continue to believe that the net impact of long-distance entry and competition in the local arena will be a slight negative for the RBOCs,"

Grubman writes in his latest research report.

Grubman puts a "hold" rating on all seven RBOCs, based on a number of factors. First, the RBOCs can't enter the long-distance market until they first demonstrate that they have opened their local loop to competition. He predicts that

the RBOCs won't enter the long-distance market until 1998, and even then, long distance will be a low-margin business.

Reingold argues that it will be easy for the RBOCs to jump into long distance because they will simply buy capacity from whichever interexchange carrier offers the lowest price. And they have four players — AT&T, MCI Communications Corp., Sprint Corp. and LDDS WorldCom — to pit against one another.

Grubman says another barrier for the RBOCs is the fact that Fortune 500 business customers are looking for global one-stop shopping and advanced features such as consolidated billing, nationwide customer service and the creation of international virtual private networks. The Baby Bells face a steep learning curve in those areas and in basic marketing, he adds.

But Reingold points out that deregulation gives the RBOCs the incentive to slash costs and to ratchet up high-margin services such as voice mail, caller identification, second lines and Integrated Services Digital Network.

Mergers also are likely to play a role in the future of the RBOCs. The industry has been rife with talk of a Nynex/Bell Atlantic Corp. deal. And Reingold suggests that Pacific Bell could ultimately join the deal, creating an East Coast-West Coast RBOC triumvirate.



Timothy Cook

1995 RBOC revenues

BellSouth	\$14.5B
Ameritech	\$13.4B
Bell Atlantic	\$13.4B
Nynex	\$13.4B
SBC Communications (Southwestern Bell)	\$12.7B
US West Communications	\$11.7B
Pacific Telesis Group	\$9B

Streetware

Chuck Phillips

CA: Quietly becoming a giant

When I started following Computer Associates International, Inc. (NYSE:CA) as a budding analyst 10 years ago, few of us thought it would ever report \$1 billion in sales in a single quarter. And yet that's just what it did in its most recent quarter.

Clearly, the company has created stockholder wealth. CA's stock was at \$7.58 10 years ago. Today, it's about \$70, and revenue is headed for \$3.5 billion. Moreover, CA has managed to keep 39 cents — after expenses but before taxes — of every dollar of revenue. Most software companies keep only 17 cents.

Still, the Street has doubts. The price-to-earnings ratio of comparable companies, such as Oracle Corp. (NASDAQ:ORCL) and Informix Corp. (NASDAQ:IFMX), is 35-to-1 or 40-to-1 compared with about 20-to-1 for CA. Why? Investors like companies with visible, easy-to-understand products. Few investors understand what goes on in computer boiler rooms. And 70% of CA's revenue is derived from mainframe-related products.

But CA's products manage a valuable asset: the enterprise computing infrastructure of the last two decades. During that period, the company either beat or bought its competition and now dominates its market.

However, like every company with a good growth story, CA faces a few risks. First, how will the company's business model change as customers migrate to distributed computing? Its success with CA-Unicenter may determine the answer to that question.

Secondly, will CA's strategy of financing customer purchases turn the company into a bank with bum loans? Although the strategy has helped it to gain market share, CA has about \$2.7 billion of receivables — money owed by customers — on its balance sheet. While the numbers are nerve-racking, cash flow suggests that the receivables are fine.

Thirdly, the pending IBM (NYSE:IBM)/Tivoli Systems, Inc. (NASDAQ:TIVS) combination poses a challenge. The pairing will offer the market a solid architecture for systems management. However, it also will encourage IBM competitors Hewlett-Packard Co. (NYSE:HWP) and Sun Microsystems, Inc. (NASDAQ:SUNW) to partner more closely with CA.

CA's huge installed base, tight cost controls and strong sales force will likely translate into continued growth. Despite spotty customer support in the early 1990s, the company has significantly improved customer relationships over the past three years. And CA's flexible licensing plans have been a hit with customers.

CA has proved the skeptics wrong for many quarters, and we expect its success to continue.

Phillips is the enterprise software industry analyst at Morgan Stanley & Co., a global investment banking firm in New York. He welcomes comments at chasp@ms.com or (212) 761-4450.



Stock Ticker February 23, 1996

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Stock Ticker

Gainers		Losers	
PERCENT		PERCENT	
Intelligent Info. Systems	23.1	Pinnacle Micro Inc.	-35.6
State of the Art	21.6	Merisell	-35.6
and Dimension	20.5	Radius Inc. (I)	-19.2
Tic-Off Systems	20.4	VLSI Technology	-16.7
LSI Logic Corp.	17.3	DSC Communications	-12.5
US Robotics (H)	17.0	Intersync	-9.6
Remcon Corp. (P)	17.0	Cognitronics Corp.	-7.5
Uninet Corp.	15.7	Uninet Tech.	-7.5
DOLLAR		DOLLAR	
US Robotics (H)	17.25	Pinnacle Micro Inc.	-4.50
Shiva Corp.	9.75	DSC Communications	-4.44
Intelli Inc.	8.00	Uninet Tech.	-3.00
Cascade Communications (H)	7.00	VLSI Technology	-2.38
IBM (H)	6.88	Netscape Comm. Corp.	-2.00
TCOM Systems Inc.	6.75	Netscape On-Line	-1.63
Alma Associates	6.00	GTE Corp.	-1.50
Security Dynamics Tech.	6.25	Network Equipment Tech.	-1.50

Industry Almanac

Cashing in on chips

Despite bad news from the integrated circuit industry, investors may still be able to cash in on chips. Analysts point out that there are still good investment opportunities here. The key is to avoid companies that make memory chips and those that ship most of their chips to the PC industry.

Those two categories make up 60% of the industry, with the other 40% consisting of firms that make other types of chips, such as microcontrollers and programmable logic devices, said Drew Peck, an analyst at Cowen & Co. in Boston. The best investments today are in that "other" category, he says.

One company in this category is **LSI Logic Corp. (LSI)**. Although it has made chips for the PC industry, "right now, their exposure to PCs is probably in the single digits," Peck notes.

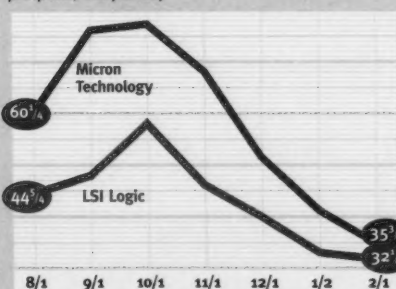
Dan Niles, an analyst at Robertson Stephens & Co. in San Francisco, agrees that LSI Logic is a good play. Although the firm may have a rough upcoming quarter, it is "well positioned in the communications sector, with essential parts in [Asynchronous Transfer Mode] and digital video disc," he says.

By all means, though, stay away from memory chip stocks, such as **Micron Technology, Inc. (MU)**. Niles points out that memory prices, already plunging, are likely to take another hit in late March as the Japanese end their fiscal year and flush out excess inventory.

"I wouldn't touch memory companies with a 10-foot pole right now," Peck says. —*Tam Harbert and Stewart Deck*

Falling where they may

Despite a rough six months, chip companies with limited exposure to the PC industry, such as LSI Logic, are good prospects, analysts say



52-WEEK RANGE				FEB. 23 NY NET		WIK PCT		3PM		CHANGE	
MICRO				FEB. 23 NY NET		WIK PCT		3PM		CHANGE	
COMS	53.63	21.88	3COM CORP.	49.25	1.00	2.1	PFST	55.25	16.63	PEOPLESFT	55.25 3.25 6.3
AIT	66.88	40.75	AMERITECH CORP.	60.00	0.38	0.6	PTC	16.13	6.13	PHOENIX TECHNOLOGIES	13.63 0.00 0.0
ARE	15.00	2.75	AMERITECH INTL.	18.88	0.00	0.0	PLAT	16.88	3.13	PLATINUM SOFTWARE	6.13 0.63 11.4
APTS	15.00	2.75	APERTUS TECH.	4.00	0.25	6.6	PLAT	26.00	11.25	PLATINUM TECHNOLOGY	13.63 0.75 5.8
ASND	47.25	6.63	ASCEND COMMUNICATIONS	66.00	0.13	-0.2	PRGS	38.00	19.50	PROGRESS SOFTWARE CORP.	21.81 1.44 7.1
BNVN	18.63	6.00	BANYAN SYSTEMS INC.	48.40	-0.56	-6.3	RNBO	26.75	15.13	RANBOW TECHNOLOGIES INC.	23.00 -0.25 -1.1
BNET	50.00	20.38	BAY NETWORKS INC.	47.50	2.50	5.6	ROSS	7.75	2.19	ROSS SYSTEMS	2.50 0.00 0.0
BEL	80.38	50.75	BELL ATLANTIC CORP. (H)	67.38	-1.13	-1.6	SOCI	55.75	11.88	SECURITY DYNAMICS TECH.	65.75 6.25 10.5
BLI	45.88	28.25	BELL SOUTH CORP.	40.28	0.25	2.0	SNEY	15.13	13.38	SOFTWAY INTERNATIONAL INC.	13.38 2.13 9.0
BSN	48.75	15.63	BOLT, DEANER AND NEWMAN	33.00	1.00	3.1	SPCO	5.13	2.19	SOFTWARE PUBLISHING CORP.	3.00 0.13 4.3
BRKT	35.50	12.75	BROOKTRUST TECHNOLOGY	33.75	0.31	0.9	SOAK	24.00	16.00	SOA INC.	22.25 0.00 0.0
CS	45.88	28.25	CBEST SYSTEMS	75.75	0.13	8.2	SOTA	13.38	4.63	STATE OF THE ART	13.38 2.38 21.6
CSCC	108.50	30.38	CASCADE COMMUNICATIONS (H)	108.50	7.00	6.9	SSW	65.50	32.88	STERLING SOFTWARE INC. (H)	64.88 1.88 3.0
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KCOM	18.50	8.75	CROSSCOM	10.50	-0.19	-1.8	SYSP	18.13	7.75	SYSTEMSUPPORT CORP.	11.31 -0.69 -5.7
DIGI	64.00	21.88	DSC COMMUNICATIONS	31.19	-4.44	-12.5	TRUV	10.13	3.88	TRIVISION CORP.	5.50 0.25 4.8
FORE	67.75	25.00	FORE SYSTEMS INC.	67.25	6.75	11.2	WAL	55.50	13.00	WALL DATA INC.	15.25 1.25 8.9
GDC	24.38	9.25	GENERAL DATACOM INC.	11.88	0.00	0.0	WALK	11.13	4.63	WALKER INTERACTIVE SYSTEMS	10.25 0.13 1.2
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MICM	12.50	5.50	MICOM COMMUNICATIONS CORP.	8.00	-0.13	-1.5					
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NWIK	42.00	19.09	NETWORK EQUIPMENT CORP.	40.13	0.00	0.0	SPVG	61.00	13.25	SPYGLASS INC.	31.13 -0.75 -2.4
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PCTL	43.88	13.25	PICTURETEL CORP.	41.75	2.25	5.7					
PTON	10.75	5.50	PROTEON INC.	6.13	0.38	6.8					
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SHVA	82.75	27.00	SHIVA CORP.	82.75	9.75	13.4					
SBC	60.25	39.63	SOUTHWESTERN BELL CORP.	56.38	0.75	1.3					
SPR	45.50	27.75	SPRINT CORP.	44.13	0.13	0.3					
SMSC	59.50	12.50	STANDARD MICROSYSTEMS CORP.	16.50	0.63	4.0					
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XIRC	18.00	8.88	XIRCOM	10.50	0.19	1.8					
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GAT	37.50	16.00	GATEWAY 2000 INC.	30.25	1.88	6.6	INTC	78.38	38.63	INTEL CORP.	60.50 2.38 4.1
HWP	100.88	56.75	HEWLETT PACKARD CO. (H)	100.88	5.75	6.0	LSI	62.50	22.50	LSI LOGIC CORP.	37.50 5.50 17.3
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CYR	29.25	16.00	CRAY RESEARCH INC.	25.50	0.75	3.0	XILX	55.50	20.38	XILINK	44.63 2.88 6.9
DIG	13.63	6.75	DIGITAL CORP.	12.63	-0.50	-3.9	ZLG	54.13	28.50	ZLOG INC.	38.38 0.50 1.3
DEC	76.50	31.50	DIGITAL EQUIPMENT CORP.	73.38	3.75	5.4					
IBM	125.00	73.75	IBM (H)	125.00	6.88	5.8					
MDI	13.00	3.00	MENDHAM DATA INC.	12.75	0.38	3.0					
NETF	7.75	4.25	NETWARE	5.31	0.19	3.7					
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SGS	10.00	3.43	SGS SYSTEMS INC.	4.38	0.00	0.0					
SRA	16.13	23.00	STRATUS COMPUTER INC.	16.88	-0.25	-0.9					
TAM	38.00	29.50	TANDEM COMPUTERS INC.	10.00	-0.13	-1.2					
TRC	2.80	2.00	TRICOM SYSTEMS	1.75	0.63	20.0					
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CAI	33.00	13.13	CAMBRIDGE CORP.	31.13	0.38	1.4	CHPS	15.88	6.25	CHIPS AND TECHNOLOGIES	8.81 -0.19 -2.1
CGN	7.25	2.25	COGNITRONICS CORP.	4.63	-0.38	-7.5	CRUS	61.13	16.00	CRUS LOGIC	19.75 0.88 4.6
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EMC	27.38	13.00	EMC CORP.	19.00	1.25	7.0	MOT	82.50	44.75	MOTOROLA INC.	78.13 2.88 5.3
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MUSI	7.50	2.44	MICROPLUS CORP.	2.88	-0.13	-4.2					
MTSI	37.75	11.25	MICRO TOUCH SYSTEMS INC.	16.00	0.75	4.9					
PEAK	34.38	16.25	PEAK TECHNOLOGY GROUP	18.13	0.25	1.3					
PNCL	19.75	5.88	PINNACLE MICRO INC.	8.13	-0.50	-35.6					
PRN	38.75	13.50	PRINTRON INC.	18.25	0.88	5.0					
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AMH	13.63	6.75	AMDAHL CORP.	8.56	-0.06	-0.7	AMR	28.88	15.50	AMERICAN MICRO DEVICES	20.38 0.38 1.9
CYR	29.25	16.00	CRAY RESEARCH INC.	25.50	0.75	3.0	ANAL	28.88	15.50	ANALOG SYSTEMS INC. (H)	18.88 1.13 5.9
DIG	13.63	6.75	DIGITAL CORP.	12.63	-0.50	-3.9	CHPS	15.88	6.25	CHIPS AND TECHNOLOGIES	8.81 -0.19 -2.1
DEC	76.50	31.50	DIGITAL EQUIPMENT CORP.	73.38	3.75	5.4	CRUS	61.13	16.00	CRUS LOGIC	19.75 0.88 4.6
IBM	125.00	73.75	IBM (H)	125.00	6.88	5.8	CYSS	63.75	10.00	CYPRESS SEMICONDUCTOR CORP.	55.25 2.00 6.1
MDI	13.00	3.00	MENDHAM DATA INC.	12.75	0.38	3.0	INTC	78.38	38.63	INTEL CORP.	60.50 2.38 4.1
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Support, NT server troubles plague Netscape

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main names, such as www.uvsg.com, from one instance of Commerce Server on Windows NT, which isn't an unusual practice.

"Occasionally, one of the domains would just shut off," explained Brian Boyd, director of Internet services at the company.

After several calls to Netscape's technical support department, "neither of us ever identified the problems," he said. United Video has since switched to Microsoft Corp.'s Internet Information Server.

A similar glitch appeared at another Netscape user site in Kentucky that was running three domains from a single Netscape Commerce Server on NT. The server, which received roughly 10,000 hits per day, had to be rebooted every three hours, the webmaster there said.

Many users were desperate for acknowledgment from their vendor. "Why have they not responded to placate our fears?" asked Richard Ruda, a developer at Open Systems International, Inc., a San Diego applications maker.

Most irksome is that "Netscape is very poor about admitting bugs, suggesting work-arounds, creating updates and patches and giving any kind of reasonable support," said Tony Ray, a programmer at Cactus International, Inc., a desktop software firm in Mount Airy, Md.

Ray said he will ask Netscape to return the \$995 he paid for a support contract after he got

Nothing but silence these last six months."

Improving support "is a major, major issue" for Netscape, Pann said. He said the vendor hires additional support staff daily. One hundred of Netscape's 700 employees work in customer support. Further, any customers with unanswered questions can send mail to Pann, he said, at davidp@netscape.com.

"Whether it's two or 20 or 200, I will make sure we follow up with each and every one," he pledged.

Netscape also points to its own Web site, which runs on Unix-

based Netscape servers, as proof that its products can handle heavy traffic. The site gets 45 million hits, or user requests, daily. That makes it one of the Top 3 most visited locales on the Internet.

Still, the support gripes are a rising tide in the Netscape-run user newsgroups on the Web. "You guys at Netscape better get your act together or you will see your market shrink dramatically," one recent missive warned.

Ted Julian, an analyst at International Data Corp. in Framingham, Mass., said he wasn't surprised by support complaints. Netscape's hypergrowth in the six months since its initial public offering makes the vendor a prime candidate for falling short of customer demands.

Microsoft, IBM and other more established vendors already have set up high-volume support centers, Julian noted. "That's going to be a differentiator for these Fortune 500 companies evaluating [Web] products."



Pretty but performance-killing 3-D Internet standard draws support. See page 65.

Products add BBS-style discussion groups to 'net

By Mitch Wagner

Last week, users were pitched a trio of products designed to add bulletin board-style discussion group capabilities to the Internet.

The packages will allow users to hold on-line discussions on an Internet site by posting short text messages to a bulletin board service (BBS)-style setup, organized by subject.

The announcements included the following:

- **O'Reilly & Associates** in Sebastopol, Calif., is shipping its \$175 WebBoard, a no-frills BBS server for World Wide Web servers that supports BBS-style discussion. It runs on Windows 95 and Windows NT and currently requires O'Reilly's Website server or the Web Commander server from Luckman Interactive.

- For users with more complex needs, **Galacticomm, Inc.**'s BBS server software, WorldGroup 2.0, runs side-by-side with any standard Web server. The \$476 product allows discussion groups

through plug-ins to Netscape Communications Corp.'s Navigator client.

The discussion groups are just one of a set of multimedia plug-ins available from Galacticomm. The software is available immediately.

- Also on the fancy side is Version 5 of the Wildcat BBS from **Mustang Software, Inc.** The \$699 server, which will ship in April, runs on Windows 95 or Windows NT. Operators of the BBS can hold discussion groups, post files for downloading and give users access to the Web, Usenet and other Internet offerings.

Users said the marriage of technologies means it is now possible to access discussion groups without dialing in to a BBS.

"Being able to zap over via the Internet means you don't have to dial in using a long-distance provider," said David Palmer, auditing supervisor at Monterey Peninsula TV Cable in Monterey, Calif., which uses the Mustang BBS.

Utility

CONTINUED FROM PAGE 1

Even the Oracle executive who led the Duke project acknowledged its shortcomings.

"The object-oriented methods and tools proved not to be scalable to a problem of this size and complexity," said Steve Perkins, a vice president at Oracle Consulting who oversaw the CIS project. The main difficulty, he said, was generating object computer-aided software engineering tools from the data models that Oracle consultants developed during their two years on the Duke job.

Project rises again

But the CIS project isn't completely undone. Duke is applying the business rules and data models that Oracle created to replace a 22-year-old IBM VSAM-based CIS with a three-tiered IBM DB2 architecture. The resuscitated project is aptly named Phoenix "for the mythical bird that rises from the ashes," said Hugh McCutcheon, the new project manager.

Phoenix will be delivered in seven phases through March 2000, and user acceptance will be closely tracked during that time.

That tracking "gives the business [users] a chance to see the system as it's being rolled out and

suggest changes where they're needed," McCutcheon explained. "Contrast that to having someone develop what is your company's most important system over a two-year period, cutting it over a weekend and not knowing what you're getting."

Even though Phoenix is a "less ambitious" effort than the object-based scheme, McCutcheon noted that it has many of the same goals. Those include electronic bill payments via electronic data interchange (EDI) and the Internet.

Clock is ticking

All utilities are under immense time pressure to create modernized CISs because deregulation will soon allow new captive customers to choose their energy supplier.

Yet several industry experts said they weren't surprised that Duke was forced to sink Project Sea Green.

"What often happens is people build a very elegant object model, then discover that the real world is very different," said Martin Anderson, former founder and chairman of Softwright, a U.K.-based object development firm that is now part of System Software Associates, Inc. in Chicago. One of the biggest problems is mapping software objects to relational database management systems such as Oracle's, which are optimized for transaction-oriented environments. Object-oriented systems, by contrast, are event-driven systems.

Transaction-oriented systems are used to track, for example, customer orders. Event-driven

systems, by contrast, typically follow customized business rules, such as generating all customer orders greater than \$100,000 on the same programming run.

Since July, Duke has been using Microsoft Corp.'s Visual Basic to develop a Windows-based graphical interface for 1,200 CIS users (see time line).

Game plan

Duke is also using Cobol-II programming tools to generate new code for the IBM DB2 database. Among other things, Duke's 600 call center agents will use Phoenix to handle more than 1 million residential service orders annually, McCutcheon said.

Call center agents and other back-office end users will use Windows-based workstations to access customer information via

Power outage

November 1993 Duke Power signs a two-year, \$23 million contract with Oracle to build an object-oriented customer information system.

April 1995 Duke Power severs ties with Oracle after the software vendor says it needs an additional two years to complete Project Sea Green. Duke decides to phase in an IBM DB2 platform instead.

December 1995 Duke Power completes Phase I, including automated summary billing for large customers and the development of a graphical front end to mask the IBM 3270-based Green Screens.

July 1995 Duke Power begins Phases I and II of a seven-stage project, called Phoenix, scheduled for completion in March 2000.

July 1995 to March 1997 Company rolls out Phase II of the GUI front end for other business functions, such as billing questions, revenue adjustments and customer name changes.

November 1996 Company will complete year 2000 date-change fixes.

Windows NT servers.

Duke has been processing EDI-based billing with its large commercial customers since November 1995. Meanwhile, the utility already has written software for Internet-based bill payments and plans to test the software with one of its customers by midyear.

Other leading-edge utilities, such as Entergy Corp. in New Orleans, Central & South West Corp. in Dallas and Pacific Gas & Electric Co. in San Francisco, are also modernizing their CISs to reduce costs. They also want to "find out more about their customers," said Kathleen A. Lally, a utilities analyst at Salomon Brothers, Inc. in New York.



Object software influences IS buying. See page 49.

If NT wows 'em, do they need Windows 95?

.....
Charles Babcock

Dennis Martin, president of the Rocky Mountain Windows NT User Group, recently stood outside the yawning, 800-seat meeting room at the Denver Tech Center Marriott and wondered if he'd miscalculated.

The group normally drew 70 to 80 people to its meetings, and Martin had been dubious about reserving such a large meeting site. But the first unveiling of Microsoft's Windows NT with the Windows 95 user interface — NT Version 4.0 beta code — was slated to be staged before his group, and he wanted to be prepared.

As he waited for the meeting to begin, long lines of people filed by the registration desk, and soon a crowd 900-strong filled the auditorium. Windows 95 may be taking hold slowly in corporations, but in the front range of the Rocky Mountains, the next wave was anticipated to be NT.

Charles Babcock's column now appears in this space every other week, alternating with the CW Crossword Puzzle.

The crowd included information systems managers from small and medium-size companies and skilled technical people from HP, Digital, Big Six accounting firms and computer consulting companies from throughout the Denver region.

"We'll give our first class next week in Windows 95, which is shocking, because we've been ready to do it since September," said J. Michael Ray, manager at Colorado Computer Training Ltd. in Fort Collins, Colo. Corporate users have been slow to upgrade to Windows 95, he said, although a recent *Computerworld* poll found that 78% planned on doing so within the next 18 months.

At the Rocky Mountain NT User Group, assurance was in short supply that this migration would occur on schedule. With the Windows 95 interface in NT, "you'll see a lot more demand for NT Workstation," Ray predicted.

Martin has advocated skipping



The Meta View

The home and business markets are distinct, and Microsoft wants to dominate both.

the move to Windows 95 and going straight to Workstation NT for its superior robustness and security features.

"NT is safer. If one program crashes, it's not going to crash another," said another attendee, Robert Mager, a PC installer and configuration consultant in Lafayette, Colo.

There still aren't enough management utilities for NT. It doesn't support enough 16-bit device drivers. And it doesn't support Plug and Play as Windows 95 does.

Nevertheless, after the meeting, I made a \$10 bet with my favorite Windows 95 advocate that the number of IS shops that would upgrade from Windows

3.1x to NT would grow from 17% to more than 33% by the time of the 1997 *Computerworld* survey.

In response to a question, Microsoft's demonstrator of NT 4.0 at the Denver meeting, Frank Atale, made an unintentional argument

for why this will be true. When asked if Windows and Windows NT will be just one operating system, he replied, "Probably not."

The features you put in a "consumer-oriented or home operating system are not really appropriate to the business user," he noted, concluding, "We will maintain two versions going forward."

This is the first time I've heard a Microsoft official admit what I've suspected all along. The home and business markets are distinct, and Microsoft wishes to dominate both — through two distinct operating systems.

And which one do you think is the consumer operating system? The one focused on robustness

and security or the one named after the year in which it comes out?

Brion Peck, manager of support services at US Air in Pittsburgh, has found savings for the money-losing airline by using information technology to carefully analyze departmental data.

One example: He tracked the number of liquor servings going into aircraft vs. the revenue coming out. Because liquor is given away in first class, the accounting has always been loose. As he looked at the amount used vs. liquor revenue, however, he concluded that either US Air was disgorging some highly intoxicated first-class passengers or that there was some shift of stocks from first class into coach, where it could disappear in various ways. Peck implemented more precise accounting methods.

"Just being able to expose the tracking system to flight crews has increased liquor revenues dramatically," he noted.

Babcock is *Computerworld's* technical editor. His Internet address is charles_babcock@cw.com.

Inside Lines

Slipping into overdrive

Intel is gearing up to announce Pentium OverDrive upgrade processors the week of March 4. The chips are expected to provide an upgrade path to Pentium performance for those who use DX4 100-MHz-based systems, according to a source close to the company. Intel will also introduce upgrade chips for 60-MHz and 66-MHz Pentium-based systems, which will boost their performance to 100 MHz and 133 MHz, respectively. Intel will launch its 133-MHz mobile Pentium chips the same week.

Wireless link to free users

US Robotics Mobile Communications in Salt Lake City will launch a multifunction wireless link for portable systems in April at Networld/Interop '96. The Megahertz AllPoints Wireless PC Card will support electronic mail, faxing, paging and text-to-voice messaging. The card costs \$499 and fits the slot of palmtop, Apple PowerBook and Windows-based laptop systems. Two battery options power the wireless connection up to 30 hours.

Just grab a megaphone

Notes 3.34 users who haven't gone to Notes 4.0 yet may have at least one reason to consider the move. We've heard about a case where a glitch in Notes 3.34's message Reply feature sent a confidential message meant for one person to everyone in the company. It seems a user received a Global Notes message and wanted to respond to the sender only, with a copy to one other user. After hitting the Reply button and entering the sender's E-mail

address in the To: field, Notes decided to cc: the message to everyone else, too.

Call me, already!

Remember what it was like to be a lonely teen-ager, staring at the phone for hours and waiting for that special someone to call? Wouldn't it have been great to just press a "call me" button to make the other person pick up the phone? Well, that's what Edify Corp. in Santa Clara, Calif., plans to introduce March 4, with software that

combines telephony and the World Wide Web. A visitor to a Web site clicks on a "call me" button onscreen, and a background application automatically dials the visitor's phone number and connects the call to a salesperson or customer service representative when the visitor to the Web site picks up the phone. Edify hopes to sell its product to companies that conduct sales or customer service on the Internet.

Wagonload of pioneers

A who's who of networking pioneers will launch Ipsilon Networks this week. The Palo Alto, Calif., start-up will tackle the problem of making Internet Protocol more efficient for transport over ATM networks. The company will focus its efforts in rewriting the IP stack and also may announce a switch that uses the reworked code, said a source close to the group. The company has the backing of Brian Nesmith, founder of Newbridge Networks, Inc., Kalpana co-founder Larry Blair and ATM Forum executive Tom Lyon.

The 5th Wave by Rich Tennant



The way the clown tells it, he was hand-to-deliver a balloon basket to the victim, who's this big computer rat—got all the equipment you can imagine. Well, it may have just been static electricity, but we're taking the clown in for questioning anyway.

Taking a cue from the California Almond Growers Association (whose slogan is "Just one can a week, that's all we ask"), Apple's new CEO, Gilbert Amelio, reportedly circulated a memo to his public relations staff requesting that the PR machine churn out "at least one good story a week." Apple insiders say the CEO's gentle shove seems just a tad ambitious since there isn't much good news to report. Maybe Apple should just get rid of its entire PR staff. "Fire just one PR person a week, that's all we ask." If you have other irreverent suggestions to pass along, or news tips to share, call our 24-hour voice-mail tip line at (508) 820-8555 or our toll-free number at (800) 343-6474. News editor Patricia Keefe can be reached by phone at (508) 820-8183 or via the Internet at tish_keefe@cw.com.

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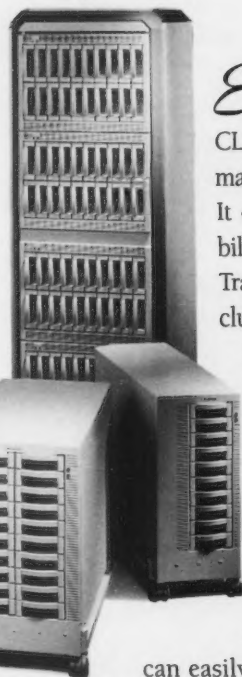
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